POOR LEGIBILITY

ONE OR MORE PAGES IN THIS DOCUMENT ARE DIFFICULT TO READ DUE TO THE QUALITY OF THE ORIGINAL

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

FACILITY NAME: H. Kramer and Company

LOCATION: 1 Chapman Way, El Segundo, California

DATE SCORED: June 6, 1991

PERSON SCORING: David Stuck

PRIMARY SOURCES OF INFORMATION:

EPA files, DHS TSCP files, Previous site investigation reports

FACTORS NOT SCORED DUE TO INSUFFICIENT INFORMATION:

Direct Contact, and Fire / Explosion

COMMENTS OR QUALIFICATIONS:

Facility Name: H. Kramer and Company

Location: 1 Chapman Way, El Segundo, Ca

EPA Region: 9

Persons in Charge of the Facility:

David Stuck - DHS
Howard K. Chapman Jr. - H. Kramer
Linda Sutton (Alschuler, Grossman and Pines) - Attorneys

Name of Reviewer: David Stuck **Date:** June 6, 1991

General Description of the Facility:

H. Kramer and Company operated a Brass and bronze smelting facility on a seven acre site in El Segundo. A fluxing material, was used to purify the molten metal. The spent flux (slag) was deposited on-site in a depression which was used by a previous owner as a disposal pond. The slag pile contains an estimated 56,250 cubic yards of slag. Lead, antimony, beryllium, copper, and zinc are found in the slag. Lead and arsenic are found in the soil. Arsenic, TCE, PCE are found in the ground water.

Scores: S_M= 54.28 (S_{gw}= 93.88 S_{sw}= 2.18 S_a= 0.00)

S_{FE}= Not evaluated

S_{DC}= Not evaluated

Ground Water Route Work Sheet					
Rating Factor	**Assigned Value (Circle One)**	**Multiplier**	**Score**	**Max. Score**	**Ref. (Section)**
1 Observed Release	0 45	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
	Total Route Characteristics Score			15	
3 Containment	0 1 2 3	1		3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 18	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	8	8	
	Total Waste Characteristics Score		26	26	
5 Targets					3.5
Ground Water Use	0 1 2 3	3	6	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1	40	40	
	Total Targets Score		46	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			53820	57,330	
7 Divide line 6 by 57,330 and multiply by 100	S_{gw} =		93.88		

Surface Water Route Work Sheet

Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 2 3	1	0	3	
1-yr. 24-hr. Rainfall	0 1 2 3	1	2	3	
Distance to Nearest Surface Water	0 1 2 3	2	0	6	
Physical State	0 1 2 3	1	1	3	
Total Route Characteristics Score			3	15	
3 Containment	0 1 2 3	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 18	1		18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score			26	26	
5 Targets					4.5
Surface Water Use	0 1 2 3	3	0	9	
Distance to a Sensitive Environment	0 1 2 3	2	6	6	
Population Served/Distance to Water Intake Downstream	0 4 6 8 10 / 12 16 18 20 / 24 30 32 35 40	1	0	40	
Total Targets Score			6	55	
6 If line 1 is 45, multiply 1 x 4 x 5. If line 1 is 0, multiply 2 x 3 x 4 x 5			1404	64,350	
7 Divide line 6 by 64,350 and multiply by 100			S_{sw} = 2.18		

Air Route Work Sheet					
Rating Factor	**Assigned Value (Circle One)**	**Multi-plier**	**Score**	**Max. Score**	**Ref. (Section)**
1 Observed Release	0 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2 Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
3 Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Targets Score			39	
4 Multiply 1 x 2 x 3			0	35,100	
5 Divide line 4 by 35,100 and multiply by 100			S_a = 0.00		

	S	S^2
Groundwater Route Score (S_{gw})	93.88	8813.45
Surface Water Route Score (S_{sw})	2.18	4.75
Air Route Score (S_a)	0.00	0.00
$S_{gw}^2 + S_{sw}^2 + S_a^2$		8818.20
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		93.91
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}\,/\,1.73 = S_M =$		54.28

GROUND WATER ROUTE

1.OBSERVED RELEASE

Contaminants detected (5 maximum):

Arsenic	140. mg/l
Carbon Tetrachloride	43. ug/l
1,1 Dichloroethylene	19. ug/l
Tetrachloroethylene	200. ug/l
Trichloroethylene	370. ug/l

Rationale for attributing the contaminants to the facility:

1) A site location map showing the facility boundaries, sampling points, drinking water wells within a three mile radius is included as References 1 and 11.

2) A facility map showing the location of; on-site monitoring wells, waste storage/disposal areas, sampling points, ect is included as Reference 1.

3) Aquifer information:

The surface deposits over the site are classified as the "Older Dune Sand" formation . These are wind blown formations of late pleistocene age. The Older Dune Sand consist of fine to medium sand with gravel lenses. Generally the Older Dune Sand consists of three divisions: a deeply weathered surface, an intermediate horizon of clean sands and a basal beach sands and gravels, and lower most horizon which apparently includes a zone of transition to the underlying Bellflower Aquiclude. The fine sediments of the Bellflower aquiclude restrict downward movement of ground water. However the Bellflower Aquaclude is missing along the ocean and ground water can move laterally into an area where the downward percolation can occur. The Bellflower aquiclude is absent west of the corner of Rosecrans and Sepulveda Boulevards approximately .7 mile down gradient of the H. Kramer Site. Beneath the Older Dune Sand formation is the Lakewood formation which is made of the upper pleistocene deposits other than the Older Dune Sand. Lithologic changes in the Lakewood formation are rapid and are representative of typical alluvial stream deposits. The Gage Aquifer is the basal member of the Lakewood formation. The composition of the gage is a fine to medium sand and is approximately 50 feet thick under the site, beginning at 40 feet below mean sea level.
Below the Lakewood formation is the San Pedro Formation composed of lower pleistocene deposits of marine origin. The upper of the two aquifers in the San Pedro formation is the Lynwood. The Lynwood is a confined aquifer comprised of sands and sandy silts. It merges with the underlying Silverado aquifer near the vicinity of the H. Kramer Site.

The Silverado is the lowest aquifer in the San Pedro Formation. The Silverado Aquifer begins at approximately. 150 feet below mean sea level and is made up of blue to grey sand, gravel, silt and clay marine. The base of the Silverado aquifer is approximately 250 feet below sea level. Near the Santa Monica Bay, the Silverado is in hydraulic continuity with the Gage Aquifer. References 2 and 3.

4) Arsenic has been detected in down gradient well MW5 at greater concentrations than in upgradient well MW3. Reference 1.

5) The depths upgradient well (W-3) and the contaminated downgradient or onsite well (MW5) indicate they are drawing water from the same aquifer Reference 1.

6) Soil borings on the site indicate the following contaminants are present:

antimony	89 ppm (wet)
arsenic	2800 ppm
beryllium	.84 ppm
copper	613 ppm
lead	118 ppm
selenium	300 ppm

Reference 1.

7) The H. Kramer facility operated as a brass foundry. A fluxing agent was added to the molten metal to remove impurities. The spent agent (slag) was removed from the furnace area and disposed into a depression on the north east end of the property. This depression before use as a disposal area for slag was once described as an "arsenic pond" Reference 8. This slag pile contains an estimated 100,000 cubic yards of material and has no containment barrier between the slag and the soil. Samples taken from the slag pile indicate that the following contaminants are present:

antimony	1000 ppm
arsenic	1000 ppm
beryllium	230 ppm
copper	12,000 ppm
lead	2500 ppm
selenium	2.7 ppm (wet)

Reference 1.

2. ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifer(s) of concern:

(Ref. 1,2,3) Old Dune Sand Aquifer 75-80 feet) and the underlying Gage and Silverado Aquifers constitute the aquifers of concern due to the interconnection of aquifers.

Depth from the ground surface to the highest seasonal level of the saturated zone of the aquifer of concern:

Not evaluated due to five years of drought conditions.

Depth from the ground surface to the lowest point of the waste disposal/storage:

(Ref. 1,4) 9 ft

Net Precipition

Mean annual or seasonal precipitation (list months for seasonal):

(Ref. 5) 11.09 inches seasonal precipitation. (November - April)

Mean annual lake or seasonal evaporation (list months for seasonal):

(Ref. 6) 17.48 inches seasonal lake evaporation (November - April)

Net precipitation (subtract the above figures):

-6.39 inches net seasonal precipitation

Permeability of Unsaturated Zone

Soil Type in unsaturated zone:

(Ref. 4) Sand, silty sands with lenses of silty clays

Permeability associated with soil type:

(Ref. 7) 10^{-3} to 10^{-5} cm/sec.

<u>Physical State</u>

Physical state of substances at time of disposal:

(Ref. 8) Wastewater, unconsolidated solids

* * *

3. CONTAINMENT

<u>Containment</u>

Method of waste or leachate containment evaluated:

(Ref. 1, 8) Surface impoundment containing waste water and has no liner or means to prevent leakage of waste materials from impoundment. (not in use since 1951)

Slag pile with no cover, no liner and with hazardous constituents above the STLC

Method with highest score:

Both

* * *

4. WASTE CHARACTERISTICS

<u>Toxicity and Persistence</u>

Compounds evaluated:

(Ref. 1, 10) Arsenic
Carbon tetrachloride
1,1 Dichloroethylene
Lead
Trichloroethylene

Compound with highest score:

(Ref. 9) Arsenic
Lead
Carbon Tetrachloride
Tetrachloroethylene

<u>Hazardous Waste Quantity</u>

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0:

56,250 cubic yards

Basis of estimating and/or computing waste quantity:

(Ref. 1) From the site plan, the aerial extent of slag pile measures 675 ft by 150 ft. Boring logs show the depth of fill as being 15ft.

$675 \text{ ft} \times 150 \text{ ft} \times 15 \text{ ft} = 1,518,750 \text{ ft}^3$

$1,518,750 \text{ ft}^3 / 27 \text{ ft}^3/\text{yd}^3 = 56,250$ cubic yards

* * *

5. TARGETS

<u>Ground Water Use</u>

Use of aquifer of concern within a three mile radius of the facility:

(Ref. 11, 12, 13, 14, 15, 16, 17) Aquifer of concern is used for public water supply, and industrial purposes within a three mile radius of the facility.

<u>Distance to the Nearest Well</u>

Location of nearest well drawing from the aquifer of concern:

(Ref. 11) Corner of Douglas Street and Chapman Way.

Distance to the above well or building:

(Ref. 11) The nearest wells drawing from the aquifer of concern is approximately 760 feet to the South and southwest of the slag pile.

Population Served by Ground Water Wells Within a Three Mile Radius

Identified water supply wells drawing from the aquifer of concern within a three mile radius and populations served by each:

(Ref. 12, 13, 14, 15, 16, 17)	City of Manhattan Beach #15	43,000
	City of Hawthorne #4	37,000
	California Water Service #802	2,000
	City of Torrance #4 & #5(blended)	25,000
	Southern California Water Co.	
	Compton	7,000
	Chicago	5,000
	Chaldron #1	10,000
	Chaldron #2	10,000
	Dalton #1	6,000
	El Segundo	5,000
	TOTAL	150,000

Computation of land area irrigated by supply wells drawing from aquifer of concern within a three mile radius and conversion to population (1.5 people per acre):

N/A

Total Population served by Ground Water within a three mile radius:

The documented population is 150,000

* * *

SURFACE WATER ROUTE

1. OBSERVED RELEASE

Contaminants detected in the surface water downhill from the facility:

N/A

Rationale for attributing the contaminants to the facility:

N/A

* * *

2. ROUTE CHARACTERISTICS

<u>Facility Slope and Intervening Terrain</u>

Average slope of facility in percent:

(Ref. 18) Less than 3%

Name/description of nearest downslope surface water:

(Ref. 18) Dominguez Channel/flood control drain

Average slope of terrain between facility and above-cited surface water body in percent:

(Ref. 18) Less than 3%

Is the facility located either totally or partially in surface water?

(Ref. 18) No.

Is the facility completely surrounded by areas of higher elevation?

(Ref. 18) No.

<u>One year, 24 Hour Rainfall in Inches</u>

(Ref. 5, 19) 2.4 inches

<u>Distance to nearest Downslope Surface Water</u>

(Ref. 18) Greater than 2 miles

Physical State of Waste

(Ref. 1, 8) Solid

* * *

3. CONTAINMENT

Containment

Methods of waste leachate containment evaluated:

(Ref. 10,19) Containers sealed in sound condition (roll off bins) but lacking diversion or containment system.

waste pile not covered, wastes unconsolidated with no diversion or containment.

Method with highest score:

waste pile

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compounds evaluated:

(Ref. 1, 10) Arsenic
Beryllium
Copper
Lead

Compound with the highest score:

all of the above receive maximum score

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0.

56,250 cubic yards

Basis of estimating and/or computing waste quantity:

(Ref. 1) From the site plan, the aerial extent of slag pile is 675 ft by 150 ft. The boring logs show depth of fill as being 15 ft. The approximate volume of slag is:

$675 \text{ ft} \times 150 \text{ ft} \times 15 \text{ ft} = 1{,}518{,}750 \text{ ft}^3$

$1{,}518{,}750 \text{ ft}^3 / 27 \text{ ft}^3/\text{yd}^3 = 56{,}250$ cubic yards

* * *

5. TARGETS

Surface Water Use

Uses of surface water within three miles down stream of the hazardous substance:

(Ref. 19, 22) No surface water is used for drinking or injection purposes within three miles down stream of the facility. (Recreational use is in the Pacific Ocean, where the Dominguez Channel enters the Los Angeles/Long Beach Harbor twelve miles south of the site. Commercial fishing within 1 mile of this harbor produces 95,802 pounds of fish per year.)

Is there tidal influence?

N/A

Distance to a Sensitive Environment

Distance to a five acre minimum coastal wetland, if two miles or less:

(Ref. 18) Greater than two miles

Distance to an five acre minimum freshwater wetland, if one mile or less:

(Ref. 18) Greater than one mile

Distance to critical habitat of an endangered species or National Wild life refuge if one mile or less:

(Ref. 21) Less than 1/4 mile. Euphilotes battoides allyni
El Segundo Blue butterfly

Population Served by Surface Water

Locations of water-supply intakes within three miles (freeflowing bodies) or one mile (static water bodies) downstream of the hazardous substance and population served by each intake:

(Ref. 19, 22) None.

Computation of land area irrigated by above-cited intakes and conversion to population (1.5 people per acre):

N/A

Total population served:

0

Name/Description of above water bodies:

N/A

Distance to above cited intakes, measured in stream miles:

N/A

REFERENCES

1) Site Charaterization Report for the H. Kramer & Company Facility, El Segundo, California. ENSR, February 1990

2) "Planned Utilization of the Groundwater Basins of the Coastal Plain of Los Angeles County". Ca.Dept of Water Resources Bullitin No. 104

3) Map of Location of Basin Boundries and Geologic Sections; Ca. Dept of Water Resources, Southern District, 1975

4) Soil Boring Logs of the Slag Pile area, H. Kramer Site, El Segundo, Ca. ENSR, 7/27/90

5) Imaa, Peter, Los Angeles County Flood Control District, and David Stuck, Ca. Dept. of Health Services, Telephone Conversation, April 29,1991

6) Climatic Atlas of the United States, U.S. Dept. of Commerce. Environmental Data Service, June 1968

7) "Hazard Ranking System Guidance Manual for Fiscal year 1989". State of California, Dept of Health Services, Toxic Substances Control Division, August 1988

8) Sutton, Linda, Aschuler, Grossman and Pines and Hamid Saebfar, Ca. Dept of Health Services, Letter, November 27,1990

9) "EPA Hazard Ranking System Waste Characteristics Values; Toxicity/Persistance Matrix".

10) "H. Kramer and Company, Site Assessment. El Segundo, California", Ecology and Environment, May 16,1988

11) "Preliminary Endangerment Assessment Report for Manhatten Market Place Site", PIC Environmental, March 13, 1990.

12) Arseneau, Mark, City of Hawthorne, Water Department, and Jeffery Muller, Ecology and Environment, Inc., Telephone Conversation, Dec. 19,1989.

13) Costas, Frank, Southern California Water Company and Louis Flynn, Ecology and Environment, Inc., Telephone Conversation, Jan. 5,1990

14) Costas, Frank, Southern California Water Company and Louis Flynn, Ecology and Environment, Inc., Telephone Conversation, Jan. 26, 1990 .

15) Schaich, Chuck, City of Torrance, Water District and Christopher R. Harner, Ecology and Environment, Inc., Telephone conversation, Feb. 7, 1990

16) Mason, Bert, California Water Service Company, and Louis Flynn, Ecology and Environment, Inc., Telephone Conversation, Jan. 5, 1990

17) Erikson, Bob, City of Manhatten Beach and Christopher Harner, Ecology and Environment, Inc., May 14, 1990

18) U.S.G.S. Topographic Map, 7.5 minuite Series, Venice, Ca. Quadrangle 1964 photorevised 1981

19) "CERCLA Preliminary Assessment. H. Kramer and Company", Ecology and Environment, Inc., June 25, 1990

20) Lewis, William, U.S. Environmental Protection Agency, and Randy Randell, Ecology and Environment, Letter, October 9, 1989

21) California Dept. of Fish and Game, Natural Diversity Data Base, Venice Quadrangle, April 1, 1989

22) Farag, George, Los Angeles Flood Control District, and David Stuck, Ca. Dept. of Health Services, Telephone Conversation, April 30, 1991

REFERENCE # 1

ENSR

Site Characterization Report for the H. Kramer & Company Facility, El Segundo, California

Submitted to: EPA Region IX

Prepared for: Alschuler, Grossman & Pines,
Counsel for H. Kramer & Company

Prepared by: ENSR Consulting and Engineering

February, 1990

Document No. 9500-089-600

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

FIGURES

TABLES

APPENDICES

1.0 INTRODUCTION

ENSR Corporation has been retained by H. Kramer & Company and California Reality Holdings, Inc. to conduct an environmental site characterization for the H. Kramer & Company facility located in the city of El Segundo, California. The site characterization work was intended to continue compliance with the requirements contained in Section V.D of the EPA's Order No.88-19, dated June 7, 1988 (the "Order") (Appendix A) pertaining to the assessment of the Kramer site. A Second Revised Site Characterization Work Plan was submitted to Region IX EPA in September, 1989, and subsequently approved.

2.0 OBJECTIVES & APPROACH

2.1 OBJECTIVES

The site characterization work is intended to accomplish the following objectives:

- Assess metals composition within the subsurface soils.
- Assess metals composition within the uppermost groundwater.
- Characterize the metals composition of the slag pile.
- Establish groundwater flow direction and hydraulic gradient.

2.2 APPROACH

The field investigation included excavation of subsurface borings, using a continuous flight hollow-stem auger drill and soil sample collection utilizing a California modified eighteen (18) inch three-ringed (sleeved) split-spoon drive sampler. Borings were placed at strategic locations to aid in estimating the extent of potential constituents of concern. Monitoring wells were placed in locations where possible groundwater contamination can be evaluated within the limitations of surface obstructions (i.e., building structures).

Soil samples were collected from each of the soil borings, including those converted into monitoring wells, at prescribed intervals using protocols described in the August, 1989 Work Plan, and accepted by EPA. The samples were logged by the field geologist, stored and transported under chain-of-custody procedures, and analyzed by a California-certified hazardous waste laboratory using acceptable protocol.

Groundwater depth, pH, conductivity, and temperature data were collected from developed monitoring wells. The hydraulic gradient was estimated from groundwater and surface elevation measurements. Groundwater samples were collected from the monitoring wells and submitted for analysis.

All work was performed in accordance with applicable Federal, State, and local laws, ordinances and statutes, and generally accepted sampling protocols and procedures.

3.0 SITE BACKGROUND

The site is bounded between the Southern Pacific Railroad line to the north, the Atchison, Topeka and Santa Fe Railroad line to the south and Douglas Street to the east. A site location map illustrating boundaries and features is presented in Figure 3-1.

H. Kramer & Company purchased the site in 1951 from Harshaw Chemical Company, and began to operate a brass foundry at the site shortly thereafter. Foundry operations ceased in approximately April 1985, and the facility has been dormant since that date. Review of historical aerial photography suggests that development of the site began as early as 1941.

3.1 OPERATING ASSUMPTIONS

Prior to the site characterization work, the surficial work specified in Kramer's Second Revised Work Plan for the Razing, Demolition and Salvaging of Buildings, Equipment and Materials (hereafter, the "Surface Plan") was completed[1]. It was anticipated that the EPA would then permit personnel involved in the site characterization to work using Level D personal protective equipment. The site safety officer, in consultation with the EPA On-Site Coordinator, had the discretion to require upgrade of health and safety procedures as described in the Work Plan. Following completion of personal monitoring during the initial days of field work under Level B and C protection, it was determined that a downgrading of protection was warranted. The remaining field work was conducted under Level D protection.

---

[1]H.Kramer elected not to complete the actual razing, demolition, and salvaging of the buildings, furnaces, and bag house, because it was not required by EPA.

4.0 SITE INVESTIGATION

The following sections describe the site investigation that was used to characterize this site.

4.1 BACKGROUND REVIEW

In preparation of the revised work plan, a review of geologic and hydrogeologic data and of historic aerial photographs had been conducted. A discussion of information gained from this review is presented below.

Review of aerial photographs suggests that a pond may have once existed in the same area as the existing slag pile. No other areas were observed where onsite disposal is thought to have occurred. However, EPA indicated concern that disposal of dust may have occurred at some point in time in the area near the storage silos on the western corner of the site. Therefore, additional shallow hand borings in this area were included in the investigation.

4.1.1 Local/Regional Geology/Hydrogeology

This discussion of the geologic/hydrogeologic conditions is taken in part from review of recent investigations on surrounding sites and in part from the following references:

- <u>Planned Utilization of the Ground Water Basins of the Coastal Plain of Los Angeles County</u>, Bulletin No. 104, Appendix A, Ground Water Geology, California Department of Water Resources, 1961.

- <u>Geology, Hydrology, and Chemical Character of the Ground Waters in the Torrance-Santa Monica Area, California</u>, U.S.G.S. Water-Supply Paper 1461, 1959.

The site is thought to be underlain by dune deposits to a depth of approximately 80 to 100 feet below surface. Below this eolian deposited material, a transition zone of finer sediments (Bellflower Aquiclude), and thus lower permeability, is thought to exist with a thickness of between 20 to 50 feet. Below this "confining" layer, the Gage Aquifer exists at a depth of approximately 120 feet. The uppermost free groundwater exists at a depth of approximately 75 to 80 feet below surface.

Review of aerial photography and topographic maps suggests that the site is situated in an area of relatively lower elevation than the surrounding land. In general, the area exhibits the rolling topography typical of wind deposited sand dunes. The site surface elevation is approximately 100 feet above mean sea level (MSL). The general topographic slope of the area is to the east. Elevated areas have existed in the past; approximately 200 feet directly south of the site (elevation approximately 110 feet MSL), approximately 300 feet southwest (elevation approximately 120 feet MSL), and approximately 500 feet west (elevation approximately 140 feet MSL). The surface elevation slopes to an elevation of approximately 80 feet MSL, approximately 400 feet east of the site.

4.2 SUBSURFACE INVESTIGATION: DRILLING AND SAMPLING PROCEDURES

Drilling, soil sampling, well installation, and groundwater sampling were conducted under the technical supervision of ENSR Consulting and Engineering personnel, including a California Registered Geologist. The locations of the subsurface borings and monitoring wells are indicated on the Site Plan, Figure 4-1.

4.2.1 Soil Borings

A total of nineteen (19) subsurface borings were drilled using truck mounted hollow-stem auger drills. Four (4) of the borings were drilled on a slant; two (2) of which were located on the south side of the cooling ponds, one (1) on the north side of the ponds and one (1) on the north side of the sump in the furnace building. Ten (10) vertical borings were drilled in the slag pile area and five (5) additional vertical borings were drilled and converted to groundwater monitoring wells. In addition to these, three (3) shallow hand borings were drilled in the area of the blast furnace, baghouse, and silos; and two (2) shallow hand borings were drilled in the drainage area east of the slag pile.

The shallow hand borings were placed along the north side of the blast furnace, baghouse, and storage silos, and near a drainage area northeast of the slag pile. Placement of the borings in the slag pile was to evaluate: the volume of the slag and the metals composition of underlying soils. Slant borings were placed in the areas where liquids may have leaked from their respective storage areas. Borings for most of the monitoring wells were placed along the southeast border of the site as this is the presumed downgradient position based upon previous water level measurements from the existing wells. One monitoring well was constructed in the presumed upgradient position northwest of the blast furnace and one was constructed directly southeast of the slag pile. Five (5) borings (SB1B, SB3, SB4, SB6, and SB10) in the slag pile area were drilled to depths of approximately 30 feet below the interface with native soils. Five (5) other borings (SB1A, SB2, SB5, SB8, and SB9) in the slag pile were terminated either when they encountered saturated conditions or subsurface slag materials which prevented further drilling advance.

The four (4) slant borings (B3, B4, B5, and B6) were drilled at an angle of approximately 15° to drilling depths of 50 feet (vertical depths of approximately 48 feet). The five (5) borings for monitoring well construction (MW4, MW5, MW6, MW7, MW8) were drilled to depths of approximately 30 feet below the first encounter of saturated conditions or until a competent confining layer was encountered, whichever was shallower.

For the deeper borings, soil samples were collected at 5-foot depth intervals to 30 feet, and then at 10-foot intervals until the bottom of the boring or groundwater. For the borings in the slag pile, slag samples were collected at 5-foot intervals, and soil samples were collected at 5-foot intervals starting at the slag/soil interface.

A standard penetration sampler was driven 18 inches into undisturbed soils and withdrawn to the surface and dismantled directly afterwards. The center sleeve (ring) was capped, sealed, labeled, put into cold storage (approximately 4°C) and delivered to a State certified hazardous materials/waste laboratory. Soil retained in the lower sleeve was observed for logging purposes as well as for screening in the field for volatile organics. An organic vapor analyzer with a photoionization detector (PID) was used to screen the samples for volatile hydrocarbons.

For the hand borings, penetration samples were collected at depths of 1 and 5 feet using a hand-driven sampler fitted with clean liners. No observable lead dust was encountered during drilling of the hand borings, therefore, no other samples were collected. These hand boring samples were packaged and transported to the laboratory as described above.

Drill cuttings were stored on site in approved Department of Transportation (DOT) 17H containers, appropriately labelled with a description of materials, its origin, and date of collection. The containers will remain on site until an evaluation of potential hazardous materials levels can be made at which time the soils may be removed for appropriate disposal. All sampling equipment was washed in a tap water and Alconox solution and double rinsed in distilled water prior to use.

4.2.2 Groundwater Monitoring Wells

The five (5) groundwater monitoring wells were constructed into water bearing zones determined by the managing hydrogeologist. Well materials were installed prior to withdrawal of the hollow stem auger. The wells consist of four-inch nominal diameter Schedule-40 PVC casing and screen (0.02-inch slots). The annulus surrounding the well screen and the first two (2) feet of blank pipe above the screened pipe was packed with No.3 Monterey sand. A three (3) foot bentonite sanitary seal was placed above the sand pack. The remaining annulus was filled with a cement/bentonite grout to the surface. A well head was constructed with a water-tight locking steel fill-ring set in concrete 1 inch above ground surface. No solvents or glues were utilized during well construction and all casings were be steam cleaned prior to installation. Threaded bottom caps were placed on the well casings. Illustrations of monitoring well construction features are presented on the respective boring logs (Appendix A).

Following soil sampling in Boring MW4, the borehole was backfilled to a depth of approximately 75 feet with grout and the well was constructed from this depth to the surface. During the construction of Monitoring Well MW5, 30 feet of auger was lost down hole, during retrieval of the drill string. Because of the fear that the borehole would cave before the auger could be retrieved, the well was grouted with the augers in place.

4.2.3 Monitoring Wells Development and Sampling

All monitoring wells installed for this investigation and three (3) existing monitoring wells previously installed were developed by surge block to improve the hydraulic conductivity of the filter pack. The well bores were bailed to remove sediment which entered the wells from developing operations. Following development, the wells were purged and sampled. Purging and sampling equipment were steam cleaned prior to use. At least three (3) well volumes of water were purged prior to sampling and stored on site. Groundwater pH, electrical conductivity, and temperature, were measured during purging. Water samples were collected with a Teflon Bailer. Samples for metals analyses were filtered through a 0.45 micron filter and acidified to a pH less than 2. Samples for VOC analysis were transferred directly into 40-ml VOA vials, which were checked to insure no headspace existed before being stored for shipment. Collected water samples were stored in a cooler on blue ice at approximately 4°C and transported to the laboratory for analysis under chain-of-custody protocol. Quality Assurance/Quality Control (QA/QC) samples were collected and preserved in a similar fashion and delivered to the laboratory for analysis.

Following well development, monitoring well reference points were surveyed for elevation relative to a standard datum (MSL). Water level depths were measured from the well reference points using an electric tape. Groundwater elevations were calculated by subtracting water depths from reference elevations and groundwater contours were calculated by comparing groundwater elevations from the wells. Groundwater elevation data from Monitoring Well MW5 was not used in the calculation of the groundwater contours, because it is believed that the groundwater elevations measured in Monitoring Well MW5 are anomalous.

4.2.4 Groundwater Monitoring Plan

Subsequent to the initial water level measurements made following well development, an additional set of measurements was collected. No significant variations from the initial measurements were observed.

5.0 LABORATORY ANALYSIS

Slag, soil, and groundwater samples collected during the field operations were submitted to CRL Laboratories. All samples were accompanied by a written chain-of-custody documentation.

5.1 Soils

One (1) representative slag sample from each of the slag borings (Borings SB1A, SB2, SB3, SB4, SB5, SB6, SB8, SB9, and SB10) was analyzed for Total metals (17 CAM metals, plus aluminum, iron, and manganese) and "soluble" (WET) metals (17 CAM metals, plus aluminum, iron, and manganese). An acid extraction (Method 3050) was used to determine the total metal concentrations in the slag. The California Waste Extraction Test (WET) was used to determine the soluble concentrations when in the presence of a complexing agent, citrate, which is presumed by the DHS to approximate landfill conditions. The remaining slag samples were archived.

To minimize the number of samples analyzed, the decision tree presented in Figure 5-1 was used in the selection of soil samples for analysis. Decision Levels for the process were the Total Threshold Limits Concentration (TTLC) and the Soluble Threshold Limits Concentration (STLC), as defined in the California Code of Regulations (CCR) Title 22, Division 4, Section 66699. The soil samples were analyzed for total concentrations of the 17 CAM metals in accordance with California guidelines for comparison with the TTLC's. In addition to the 17 CAM metals, total concentrations for aluminum, iron, and manganese were also determined. Soil samples with total metal concentrations that exceeded ten times the STLC, were submitted for analysis by California Waste Extraction Test (WET).

Initially, in the slag borings, the soil sample from the slag/soil interface and the soil sample from 15 feet below the interface were the first two soil samples analyzed from the boring. In the other borings the first two samples analyzed were the samples from depths of 5 and 20 feet. In each boring, if any of the Decision Levels were exceeded in the deeper of the original two samples analyzed, the next round of analyses tested for those parameters exceeding their Decision Levels in deeper samples. If, in the deeper sample, Decision Levels were not exceed, but were in the shallower sample, samples from between these two were analyzed. If Decision Levels were not exceeded in either of the inital two samples analyzed, no additional samples from that boring were analyzed.

Select soil samples were analyzed for volatile organic compounds (VOC) by EPA Method 8240. Samples were screened in the field with a Photo-ionization Detector (PID) organic vapor meter. If soil samples exceeded 50 ppm on the PID, the sample from the boring with the highest reading was selected for the VOC analysis.

5.2 Groundwater

The filtered groundwater samples were analyzed for total concentrations of 17 CAM metals (CCR Title 22), plus aluminum, iron, and manganese, using EPA Methods 3005/6010. Unfiltered samples were analyzed for volatile organic compounds, using EPA Method 8240.

6.0 RESULTS

6.1 Slag Borings Sample Analyses

Results of the metals analyses of the samples collected from the ten borings completed in the slag pile are presented in Table 6.1. In summary, five (5) samples collected of the slag material (SB1A-5, SB3-5, SB4-10, SB5-5, and SB9-3), were found to contain total lead (Pb) levels above the TTLC. All nine (9) slag samples collected from the slag pile (these five samples and SB2-5 SB6-5, SB8-10, and SB10-10) were found to contain levels of "soluble" lead by WET extraction above the STLC. Similarly, levels of copper (Cu) and zinc (Zn) were detected as both total and "soluble" in excess of the respective TTLC's and STLC's. It should be noted that the use of the WET extraction does not represent the actual solubility of the metals in question, under natural conditions, if the material were left in-place.

Some of the samples collected from the interface between the slag and the underlying materials (SB1B-15, SB3-15, and SB5-18) were found to have total arsenic (As) concentrations in excess of the TTLC. However, total lead (Pb) levels were below the TTLC in these and the other interface samples.

Soil samples collected from approximately 15 feet below the interface (SB1B-30, SB3-30, SB6-30, and SB10-30) contained total lead (Pb) levels which were well below the TTLC and also well below ten times the STLC. These samples contained total arsenic (As) levels that were below the TTLC, however, SB10-30 had a total arsenic level 38 times the STLC.

Figure 6-1 presents a cross-section along the long axis of the slag pile. Total concentrations of lead and arsenic are shown on the cross-section.

Three (3) soil samples (SB3-25, SB4-60, and SB5-10) were analyzed for Purgeable Organics using EPA Method 8240. Acetone was the only compound detected (17, 15, and 21 ug/kg, respectively) in these samples. It was reported by the laboratory that these results should not be considered representative. It is believed that these levels may represent contamination in the laboratory from the use of acetone as an extraction solvent.

6.2 Monitoring Well Borings Sample Analyses

Results of the metals analyses of the samples collected from the five borings completed for monitoring well installations are presented in Table 6.2. Soil samples collected from the borings for Monitoring Wells MW6, MW7, and MW8 contained total metal concentrations that were below even the STLC's for the respective 17 CAM metals. The samples collected from 5 and 20 feet depths were analyzed from these three borings. Since none of these levels exceed the decision level, no other samples were analyzed from these three borings.

However, some of the soil samples collected from borings for Monitoring Wells MW4 and MW5 contained levels of antimony (Sb), arsenic (As), and selenium (Se) in excess of the respective TTLC's. Additional analysis of samples from these borings was completed, the results of which are presented in Table 6.2.

One (1) soil sample (MW4-60) was analyzed for Purgeable Organics using EPA Method 8240. Acetone was the only conpound detected (15 ug/kg) in this sample. It was reported by the laboratory that this result should not be considered representative. It is beleived that this level may represent contamination in the laboratory from the use of acetone as a cleaning substance. One (1) other soil sample from a monitoring well boring (MW8-70) was selected for organic analysis based on field observations; however, because of a mistake at the laboratory, the analysis was never completed. An additional boring will be completed next to MW8, and a sample will be collected to complete this requirement of the work plan. The results will be forwarded when completed.

6.3 Slant Borings Sample Analyses

Results of the metals analyses of the samples collected from the four slant borings are presented in Table 6.3. Soil samples collected from the slant borings near the evaporation ponds (B3, B4, and B5) and the furnace building sump (B6) contained total metal concentrations that were below the TTLC's and even the STLC's (excluding B6-5) for the respective 17 CAM metals. The samples collected from 5 and 20 feet were analyzed from these four borings. Except for the arsenic level in B6-5, none of the levels exceeded the decision level and therefore no other samples were analyzed from these four borings. An analysis for "soluble" (WET) arsenic was conducted on Sample B6-5, results of which are presented on Table 6.3.

Two (2) soil samples from slant borings (B3-30 and B4-10) were selected for organic analysis based on field observations; however, because of a mistake at the laboratory, the analyses were never completed. Additional borings will be completed next to B3 and B4, and samples will be collected to complete this requirement of the work plan. The results will be forwarded when completed.

6.4 Hand Borings Sample Analyses

Results of the metals analyses of the samples collected from the five hand borings are presented in Table 6.4. Soil samples from Hand Borings HB1, HB2, and HB3 (drilled west of the Furnace Building) contained total metal concentrations well below the TTLC's for the 17 CAM metals. However, the total arsenic (As) and lead (Pb) levels in Sample HB2-5 exceeded the respective STLC's by approximately ten times. Therefore, a "soluble" (WET) analysis for these two metals was conducted on this sample and results are pending.

Hand Borings HB4 and HB5 (drilled north of the slag pile), contained total metal concentrations below the TTLC's for the 17 CAM metals. However, the total concentrations of antimony (Sb), arsenic (As), copper (Cu), lead (Pb), and zinc (Zn) levels exceeded the respective STLC's by factors greater than ten times in some of the samples. Therefore, "soluble" (WET) analyses for these metals were conducted on some of these samples and the results are presented in Table 6.4.

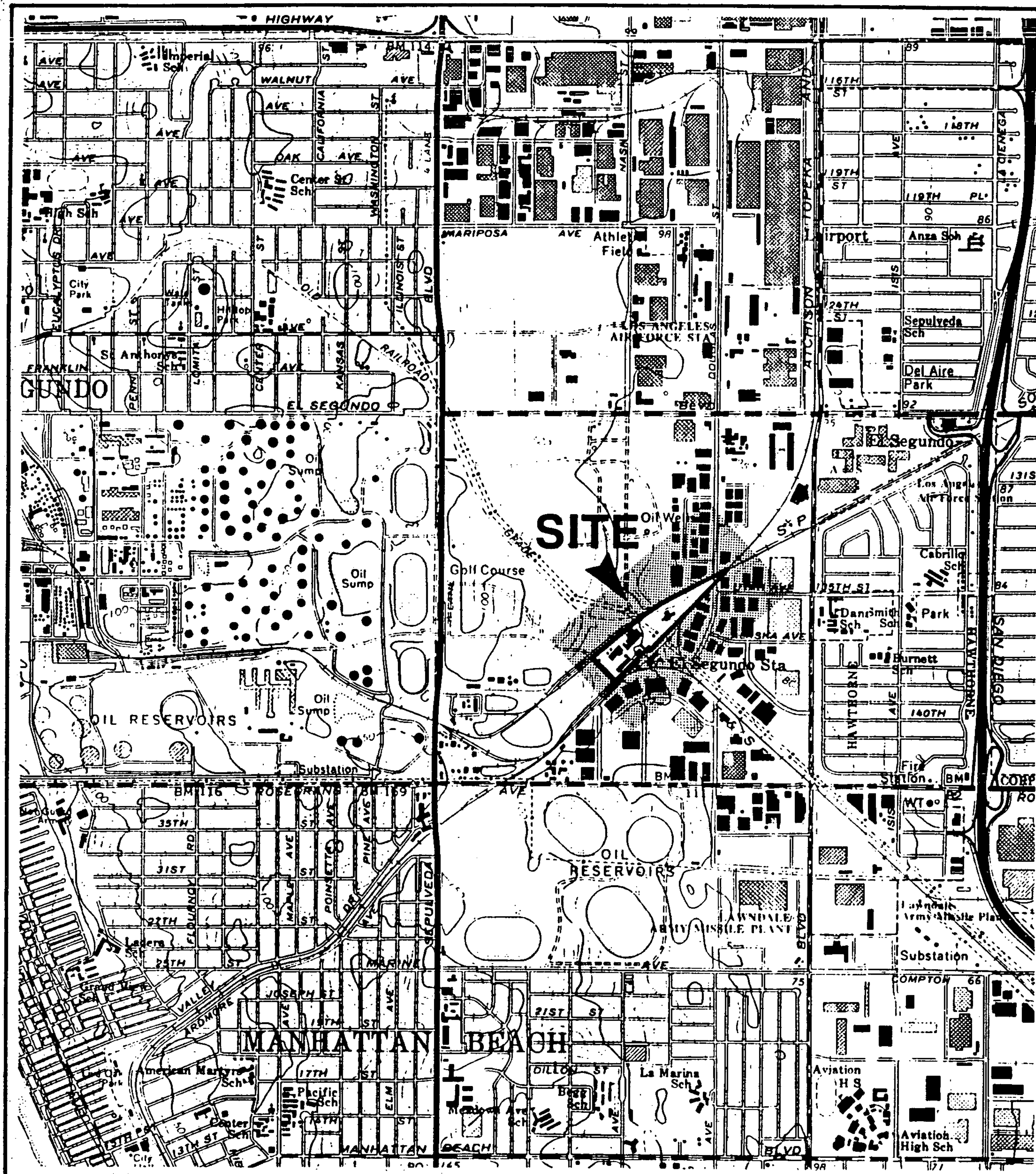
6.5 Groundwater Sample Analyses

Results of the metals analyses and the volatile organic compounds of the ground water samples collected from the monitoring wells are presented in Tables 6.5.1 and 6.5.2. Monitoring Well MW7 did not produce sufficient water for sample collection. An additional attempt to collect a sample from this well will be made in the near future and the results will be forwarded when complete. Filtered groundwater samples collected from five (5) of the eight monitoring wells (MW1, MW2, MW3, MW5, and MW6) contained various metals.

Chlorinated hydrocarbon compounds were detected in all seven of the monitoring wells for which volatile organic analyses were completed. Aromatic hydrocarbons (toluene, xylenes, and/or ethylbenzene) were also detected in groundwater samples from Monitoring Wells MW2, MW3, MW4, and MW5.

6.6 Groundwater Monitoring

Table 6.6 presents the well head reference point elevations, depth to water measurements, and calculated groundwater elevations. Based on an interpretation of the groundwater elevations measured in Monitoring Wells MW1, MW2, MW3, MW4, MW6, MW7, and MW8, groundwater appears to be flowing beneath the site in an easterly direction at the southwestern corner of the property and in a southerly direction at the northern end of the property. Groundwater appears to flow away from the property along the southeastern side of the property, in a southerly to southeasterly direction. A groundwater contour map is presented in Figure 6-2.



REFERENCE: USGS 7.5 MINUTE SERIES
INGLEWOOD QUADRANGLE 1981
VENICE QUADRANGLE 1981

N

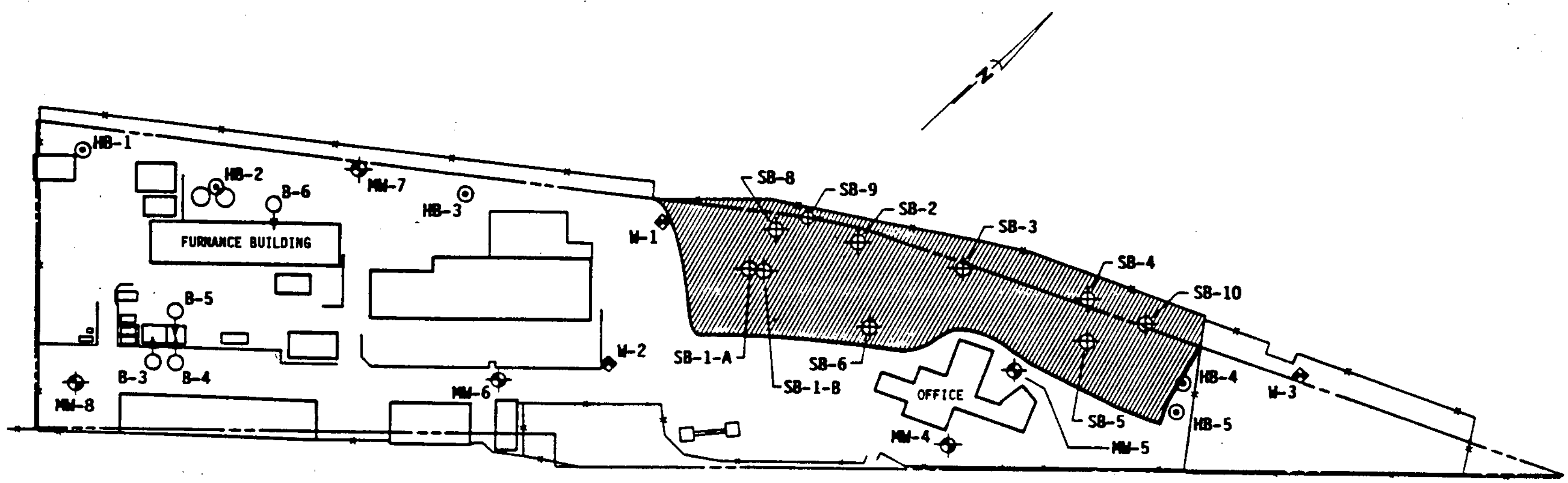
0 ¼ ½ 1 MILE

SCALE

ENSR

SITE LOCATION MAP
H. KRAMER & COMPANY FACILITY
EL SEGUNDO, CALIFORNIA

DRAWN BY: BM	DATE: 5/19/89	PROJECT NO.: 9500-077
CHK'D BY:	REVISED:	DWG.NO.: FIGURE 1-1



EXPLANATION

	SLAG PILE
W-3	LOCATION OF MONITORING WELL INSTALLED DURING PREVIOUS INVESTIGATION
SB-10	LOCATION OF SOIL BORING
MW-8	LOCATION OF SOIL BORING/MONITORING WELL INSTALLED DURING THIS INVESTIGATION
B-6	LOCATION OF SLANT BORING (SHOWING DIRECTION OF SLANT)
HB-5	LOCATION OF HAND BORING

SCALE

0 75 150 300 600 FEET

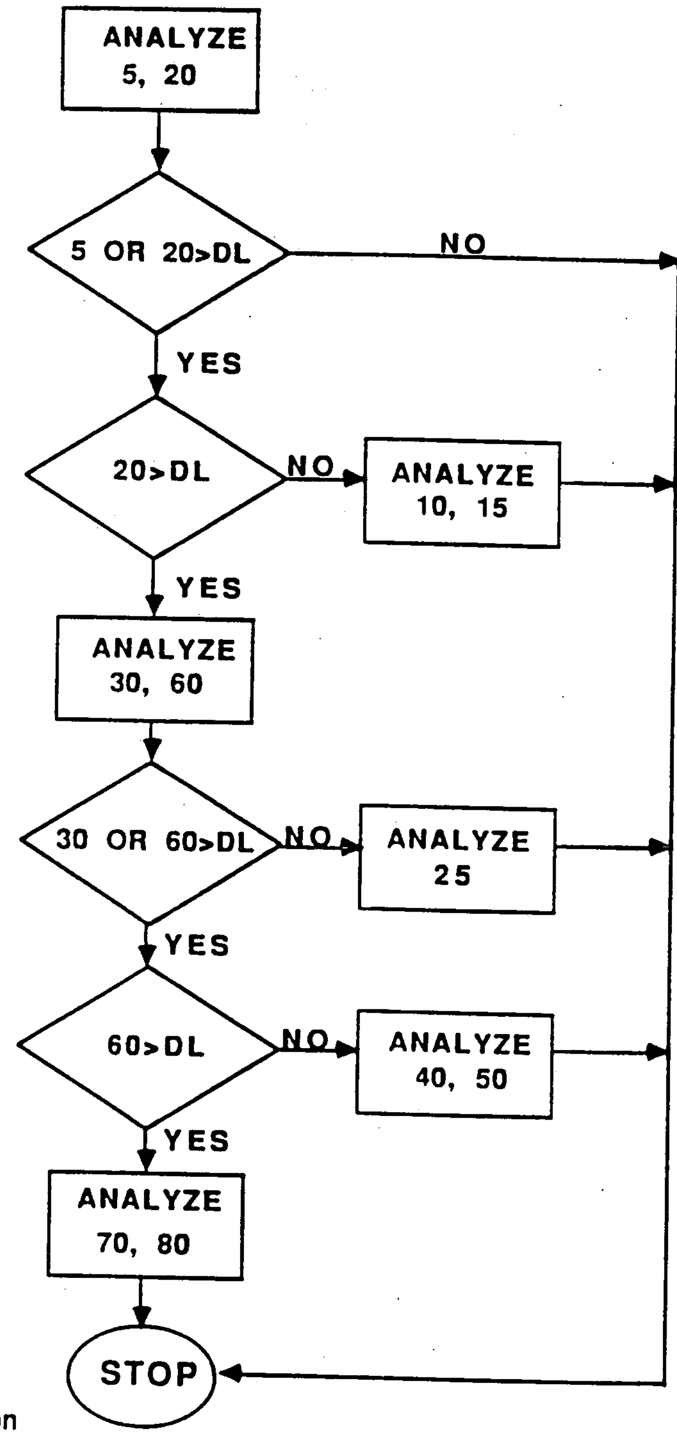
REFERENCE: JENNINGS ENGINEERING COMPANY, A.L.T.A. SURVEY, SEPTEMBER 13, 1984

ENSR

SITE PLAN
H. KRAMER & COMPANY FACILITY
EL SEGUNDO, CALIFORNIA

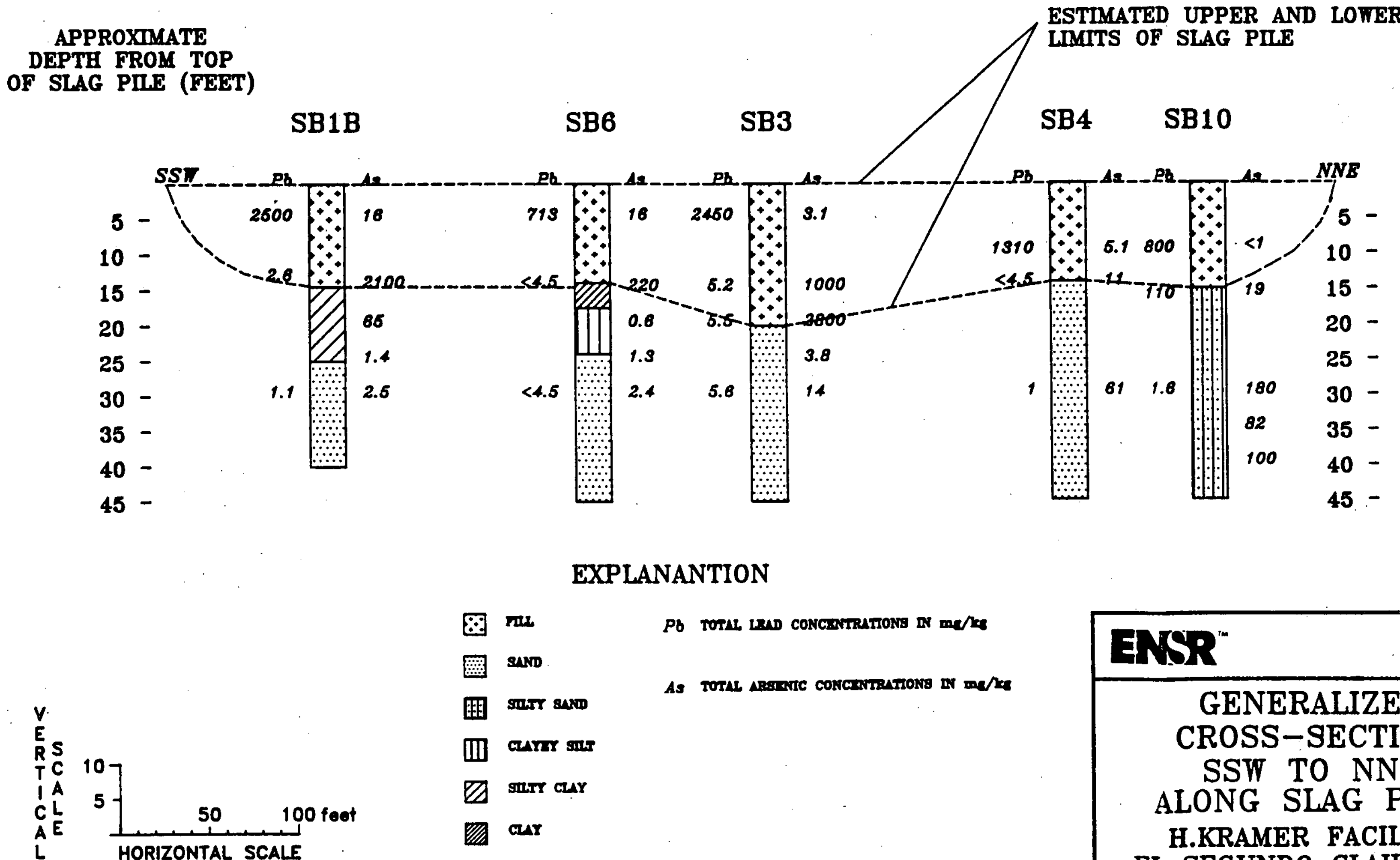
DRAWN BY:	DATE: 11/10/90	PROJECT NO.: 9500-089
CHK'D BY:	REVISED:	DWG.NO.: FIGURE 4-1

Figure 5 - 1: SAMPLE ANALYSIS DECISION TREE



NOTES

1) DL = Decision Level Concentration
2) Numbers correspond to sample depth in feet.



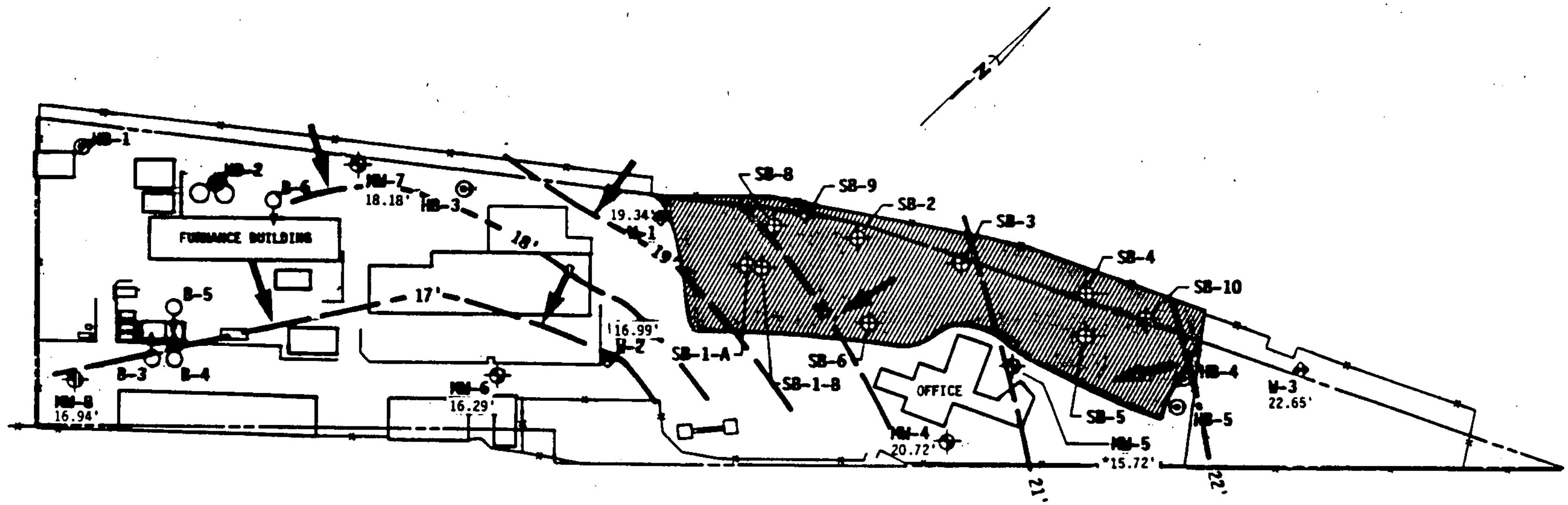
ENSR

GENERALIZED CROSS-SECTION SSW TO NNE ALONG SLAG PILE

H.KRAMER FACILITY, EL SEGUNDO CLAIFORNIA

PROJECT:8500-089

FIGURE 6-1



EXPLANATION

SLAG PILE

W-3 LOCATION OF MONITORING WELL INSTALLED DURING PREVIOUS INVESTIGATION

SB-10 LOCATION OF SOIL BORING

MW-8 16.94' LOCATION OF SOIL BORING/MONITORING WELL INSTALLED DURING THIS INVESTIGATION SHOWING GROUND-WATER ELEVATION (IN FEET ABOVE MSL) MEASURED 1/9/90

B-6 LOCATION OF SLANT BORING (SHOWING DIRECTION OF SLANT)

HB-5 LOCATION OF HAND BORING

21' APPROXIMATE GROUND-WATER CONTOUR
CONTOUR INTERVAL 1', DATUM MSL
ARROW SHOWING INFERRED FLOW DIRECTION
* GROUND-WATER ELEVATION IN MW-5 NOT USED IN CONTOUR CALCULATION

SCALE

0 75 150 300 600 FEET

REFERENCE: JENNINGS ENGINEERING COMPANY, A.L.T.A. SURVEY, SEPTEMBER 13, 1984

ENSR

GROUND-WATER CONTOUR MAP
H. KRAMER & COMPANY FACILITY
EL SEGUNDO, CALIFORNIA

DRAWN BY: AK EC	DATE: 1/10/90	PROJECT NO: 9500-089
CHK'D BY:	REVISED:	DWG.NO.: FIGURE 6-2

TABLE 6.1
RESULTS OF LABORATORY ANALYSES

Sample Totals WET	Sb mg/kg mg/L	As mg/kg mg/L	Ba mg/kg mg/L	Be mg/kg mg/L	Cd mg/kg mg/L	Cr mg/kg mg/L	Cr HEX mg/kg mg/L	Co mg/kg mg/L	Cu mg/kg mg/L	Pb mg/kg mg/L	Hg mg/kg mg/L	Mo mg/kg mg/L	Ni mg/kg mg/L	Se mg/kg mg/L	Ag mg/kg mg/L	Tl mg/kg mg/L	V mg/kg mg/L	Zn mg/kg mg/L	Al mg/kg mg/L	Fe mg/kg mg/L	Mn mg/kg mg/L
TTLC	500	500	10000	75	100	500		8000	2500	1000	20	3500	2000	100	500	700	2400	5000			
STLC	15	5	100	0.75	1	5		80	25	5	0.2	350	20	1	5	7	24	250			
SB1A-5(Total)	ND<100.0	16	310	230	6	37	ND<1.0	28	12000	2500	0.18	33	310	ND<0.1	ND<5.0	ND<1.0	27	65000	18000	31000	41000
SB1A-5(WET)	4.4	0.53	8	6.1	0.4	1	ND<0.05	0.8	68	130	ND<0.005	1.1	4.3	0.03	ND<0.2	ND<0.3	0.6	3400	530	1400	140
SB1B-15(Total)	ND<1.0	2100	45	0.3	ND<0.05	5.5	ND<1.0	4.7	15	2.6	0.15	0.07	5.3	ND<0.1	ND<0.05	ND<1.0	13	24	7400	9700	380
SB1B-15(WET)		370																			
SB1B-20(Total)		65																			
SB1B-25(Total)		1.4																			
SB1B-30(Total)	ND<1.0	2.5	15	0.13	0.16	5	ND<1.0	1.5	6.1	1.1	0.08	0.18	4.9	0.5	ND<0.05	ND<1	8.8	13	2000	4900	52
SB2-5(Total)	ND<1.0	3.7	68	47	2.2	8.2	1.21	6.3	3300	700	0.16	11	280	1.1	0.72	ND<1.0	3.6	30000	9600	19000	1200
SB2-5(WET)	3.3	0.53	9	5.3	0.4	0.7	ND<0.05	0.6	16	69	ND<0.005	2.6	11	ND<0.01	ND<0.2	ND<0.3	ND<0.2	3100	810	1100	93
SB2-16(Total	5	200	21	18	0.78	13	ND<1.0	5	1700	420	0.04	6.3	39	1.4	0.25	ND<1.0	4.1	20000	4400	19000	400
SB2-16(WET)		130							ND<0.50	5.1								2500			
SB3-5(Total)	ND<5.0	3.1	501	106	29.5	19.3	ND<1.0	17	3000	2450	0.36	24.4	116	2	1.9	ND<1.0	17.5	76000	10600	22100	1430
SB3-5(WET)	0.76	ND<0.50	14.4	3.9	4.1	0.72	ND<0.05	0.57	101	259	ND<0.005	0.84	2.4	ND<1.0	ND<0.05	ND<10.0	0.26	6830	189	623	44.8
SB3-15(Total)	102	1000	74.3	0.22	ND<0.49	7.9	ND<1	10.6	22	5.2	0.03	ND<1.9	4.6	0.9	0.97	ND<1.0	13.8	61	2910	5630	1110
SB3-15(WET)	8.9	152	4	ND<0.01	ND<0.05	0.23	ND<0.05	0.61	0.099	ND<0.25	ND<0.005	ND<0.1	ND<0.2	ND<1.0	ND<0.05	ND<10.0	0.64	4.1	32.3	160	47.1
SB3-20(Total)	ND<4.9	2800	25.6	ND<0.2	ND<0.49	6.7	ND<1.0	2.8	36.2	5.5	ND<0.02	ND<2.0	6.5	ND<0.1	ND<0.98	ND<1.0	12.9	75.6	3420	6010	104
SB3-20(WET)		12																			
SB3-25(Total)		3.8																			
SB3-30(Total)	ND<5.0	14	23.1	ND<0.2	ND<0.5	4.7	ND<1.0	1.4	13.8	5.6	0.03	ND<2.0	4.6	0.1	ND<1.0	ND<1.0	6.3	56.8	2120	3380	78.7
SB3-30(WET)	0.9	ND<0.50	2.3	ND<0.010	ND<0.025	0.1	ND<0.05	0.09	0.73	0.63	ND<0.005	ND<0.10	ND<0.20	ND<1.0	ND<0.050	ND<10.0	0.15	9.2	10.2	14	5.2

TABLE 6.1 (continued page 2)
RESULTS OF LABORATORY ANALYSES

Sample	Sb	As	Ba	Be	Cd	Cr	Cr HEX	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	V	Zn	Al	Fe	Mn
Totals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
WET	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
TTLC	500	500	10000	75	100	500		8000	2500	1000	20	3500	2000	100	500	700	2400	5000			
STLC	15	5	100	0.75	1	5		80	25	5	0.2	350	20	1	5	7	24	250			
SB4-10(Total)	ND<10.7	5.1	155	53.6	6.5	74.6	ND<1.0	13.1	4860	1310	0.09	15.9	120	1.3	1.8	ND<1.0	15.2	39500	10300	19000	1480
SB4-10(WET)	1.3	ND<0.5	4.9	2.7	0.72	1.7	ND<0.05	0.75	142	53.8	0.005	1.3	2.9	2.7	ND<0.05	ND<10	0.44	2740	315	903	98.2
SB4-15(Total)	196	11	36.7	ND<0.20	ND<0.49	4.8	ND<1.0	1.7	21.4	ND<4.9	0.04	ND<2.0	ND<3.9	17	ND<0.98	ND<1.0	7.1	36.9	2200	4260	93.6
SB4-15(WET)	41													0.02							
SB4-30(Total)	180	61	23	0.16	0.09	5	ND<1.0	1.4	6.5	1.0	0.04	0.7	5.3	19	ND<0.05	ND<1.0	7.1	9.4	4500	5300	77
SB4-30(WET)	36	5.1												0.13							
SB5-5(Total)	ND<11.8	2.8	129	49	5.4	19.5	ND<1.0	13.2	4190	1100	0.09	18.3	116	1	3.3	ND<1.0	13.5	38200	9260	16800	1720
SB5-5(WET)	3.3	ND<0.5	4	2.4	1.7	1.1	ND<0.05	0.68	166	97.4	ND<0.005	1.5	3.7	ND<1	ND<0.05	ND<10	0.42	4040	281	816	101
SB5-18(Total)	ND<4.9	1500	41.3	0.2	ND<0.49	12	ND<1.0	2.8	19.9	5	0.02	ND<2.0	6	ND<0.1	ND<0.98	ND<1.0	15.7	31.1	6560	9340	85.4
SB5-18(WET)		140																			
SB6-5(Total)	17	16	138	21.2	8.6	10	ND<1.0	3.6	53800	713	0.80	4	80.5	1	3.1	ND<1.0	8.4	41400	6420	19400	696
SB6-5(WET)	7.4	0.91	6.1	1.5	1.5	0.63	ND<0.05	0.57	178	49	ND<0.005	0.7	2.8	1.6	ND<0.05	ND<10	0.61	2460	272	1040	53.9
SB6-15(Total)	ND<4.9	220	49.4	0.32	ND<0.49	5.9	ND<1	4.0	13.5	ND<4.9	ND>0.02	ND<2	6.30	ND<0.1	ND<0.99	ND<1.0	13.2	23.7	4710	5310	283
SB6-15(WET)		48																			
SB6-20(Total)		0.6																			
SB6-25(Total)		13																			
SB6-30(Total)	ND<4.9	2.4	6.9	ND<0.2	ND<0.49	3.3	ND<1.0	ND<0.99	10.5	ND<4.9	ND<0.02	ND<2.0	ND<4.0	ND<1.0	ND<0.99	ND<1.0	5.3	15.7	1220	2270	16.2

TABLE 6.1 (continued page 3)

RESULTS OF LABORATORY ANALYSES

Sample Totals WET	Sb mg/kg mg/L	As mg/kg mg/L	Ba mg/kg mg/L	Be mg/kg mg/L	Cd mg/kg mg/L	Cr mg/kg mg/L	Cr HEX mg/kg mg/L	Co mg/kg mg/L	Cu mg/kg mg/L	Pb mg/kg mg/L	Hg mg/kg mg/L	Mo mg/kg mg/L	Ni mg/kg mg/L	Se mg/kg mg/L	Ag mg/kg mg/L	Tl mg/kg mg/L	V mg/kg mg/L	Zn mg/kg mg/L	Al mg/kg mg/L	Fe mg/kg mg/L	Mn mg/kg mg/L
TTLC	500	500	10000	75	100	500		8000	2500	1000	20	3500	2000	100	500	700	2400	5000			
STLC	15	5	100	0.75	1	5		80	25	5	0.2	350	20	1	5	7	24	250			
SB8-10(Total)	1000	1.1	63	30	1.3	16	ND<1.0	5.9	1800	440	0.06	5.1	43	2.3	3.7	ND<1.0	4.6	22000	8100	16000	1700
SB8-10(WET)	290	0.12	5.9	4.3	ND<0.2	0.6	ND<0.05	0.81	ND<0.5	39	ND<0.005	0.45	6.2	ND<0.01	ND<0.2	ND<0.3	ND<0.2	2400	400	1100	200
SB9-3(Total)	120	17	100	44	2.3	11	ND<1.0	9.2	3200	1200	0.14	9.3	90	0.5	2.5	ND<1.0	6.2	25000	12000	23000	2200
SB9-3(WET)	89	0.04	6.6	4.2	ND<0.2	ND<0.2	ND<0.05	1.2	30	97	ND<0.005	1	5.2	0.05	ND<0.2	ND<0.3	ND<0.2	3500	360	1100	150
SB10-10(Total)	ND<1.0	0.68	44	16	0.79	5.6	ND<1.0	5.3	1900	800	0.02	5.7	44	0.3	0.52	ND<1.0	3.4	24000	6000	9800	1500
SB10-10(WET)	ND<1.0	0.19	5.6	2.5	ND<0.2	0.94	ND<0.05	0.72	150	120	ND<0.005	1	5.1	0.06	ND<0.2	ND<0.3	0.22	3200	380	1100	150
SB10-16(Total)	370	19	38	5.3	0.33	5.1	ND<1.0	2.7	300	110	ND<0.02	2.4	12	22	0.11	ND<1.0	6.4	4000	3400	5400	290
SB10-16(WET)	27	0.046							7.7	2.6				0.03				110			
SB10-30(Total)	240	180	31	0.17	0.08	4.8	ND<1.0	1.8	3.8	1.6	0.03	0.57	5.1	53	ND<0.05	ND<1.0	6.7	9.7	3400	5400	110
SB10-30(WET)	17	14												0.31							
SB10-35(Total)	92	82																			
SB10-40(Total)	40	100																			

TABLE 6.2
RESULTS OF LABORATORY ANALYSES

Sample Totals WET	Sb mg/kg mg/L	As mg/kg mg/L	Ba mg/kg mg/L	Be mg/kg mg/L	Cd mg/kg mg/L	Cr mg/kg mg/L	Cr HEX mg/kg mg/L	Co mg/kg mg/L	Cu mg/kg mg/L	Pb mg/kg mg/L	Hg mg/kg mg/L	Mo mg/kg mg/L	Ni mg/kg mg/L	Se mg/kg mg/L	Ag mg/kg mg/L	Tl mg/kg mg/L	V mg/kg mg/L	Zn mg/kg mg/L	Al mg/kg mg/L	Fe mg/kg mg/L	Mn mg/kg mg/L
TTLC	500	500	10000	75	100	500		8000	2500	1000	20	3500	2000	100	500	700	2400	5000			
STLC	15	5	100	0.75	1	5		80	25	5	0.2	350	20	1	5	7	24	250			
MW4-5(Total)	5.2	2.3	33.7	ND<0.19	ND<0.49	7.5	ND<1.0	2.6	11.3	16.0	0.03	ND<1.9	8.8	ND<0.1	ND<0.97	ND<1.0	16.3	25	2510	5640	68.8
MW4-20(Total) MW4-20(WET)	ND<4.8	430 54	25.1	ND<0.19	ND<0.48	5	ND<1.0	1.9	8.8	ND<4.8	0.02	ND<1.9	4.8	ND<0.1	ND<0.97	ND<1.0	8.2	13.1	2630	4310	95.6
MW4-20xx(Total)	19.5	350	30	ND<0.19	ND<0.48	5.3	ND<1.0	2.4	27.5	ND<4.8	0.22	ND<1.9	3.9	0.1	ND<0.97	ND<1.0	8.9	25.4	2780	4730	94.9
MW4-25(Total)		94																			
MW4-30(Total)		58																			
MW5-5(Total) MW5-5(WET)	1780 380	1300 82	52.6	ND<0.2	0.78	7.3	ND<1.0	3.5	45.7	13.1	5.8	ND<2.0	9.6	300	1	ND<1.0	12.5	76.5	2980	7140	134
MW5-10(Total)	ND<1	2.5												ND<0.10							
MW5-15(Total)	ND<1	1.3												ND<0.10							
MW5-20(Total)	ND<5.0	45 0.036	11.1	ND<0.2	ND<0.5	4.3	ND<1.0	1.5	9.7	ND<5.0	ND<0.02	ND<2.0	ND<4.0	ND<0.1	ND<0.99	ND<1	7.1	14.1	1880	3200	44
MW6-5(Total)	ND<1.0	1.3	29	0.21	0.1	5.47	ND<1.0	2.48	7.53	1.66	0.02	0.09	4.35	ND<0.1	ND<0.05	ND<1.0	11	16	8100	6100	150.00
MW6-20(Total)	ND<1.0	3.9	13	0.07	0.07	2.97	ND<1.0	0.83	5.41	1.11	0.03	0.11	2.94	ND<0.1	ND<0.05	ND<1.0	3.92	14	1700	3500	34
MW7-5(Total)	ND<1.0	1.3	14	0.13	ND<0.05	3.6	ND<1.0	1.4	4.6	1.4	0.02	0.05	3.3	ND<0.1	ND<0.05	ND<1.0	7.50	8.9	2300	4700	50
MW7-20(Total)	ND<1.0	0.95	6.1	ND<0.05	ND<0.05	1.5	ND<1.0	0.47	12	0.54	0.02	0.05	2.0	ND<0.1	ND<0.05	ND<1.0	2.3	15	690	1800	20
MW7-20A(Total)	ND<1.0	0.98	6.7	ND<0.05	ND<0.05	1.9	ND<1.0	0.53	7.6	0.59	0.02	0.05	2.1	ND<0.1	ND<0.05	ND<1.0	2.5	7.1	840	1900	22
MW8-5(Total)	ND<1.0	1.9	19	0.10	0.07	6.1	ND<1.0	2	3.6	1.1	ND>0.02	ND>0.05	3.2	ND<0.1	ND<0.05	ND<1.0	11	8.5	2700	8400	110
MW8-20(Total)	ND<1.0	1.3	9.8	0.06	ND<0.05	4.7	ND<1.0	0.87	7.5	1.8	ND>0.02	ND>0.05	2.9	ND<0.1	ND<0.05	ND<1.0	4.3	21	1100	2600	31

TABLE 6.3
RESULTS OF LABORATORY ANALYSES

Sample Totals WET	Sb mg/kg mg/L	As mg/kg mg/L	Ba mg/kg mg/L	Be mg/kg mg/L	Cd mg/kg mg/L	Cr mg/kg mg/L	Cr HEX mg/kg mg/L	Co mg/kg mg/L	Cu mg/kg mg/L	Pb mg/kg mg/L	Hg mg/kg mg/L	Mo mg/kg mg/L	Ni mg/kg mg/L	Se mg/kg mg/L	Ag mg/kg mg/L	Tl mg/kg mg/L	V mg/kg mg/L	Zn mg/kg mg/L	Al mg/kg mg/L	Fe mg/kg mg/L	Mn mg/kg mg/L
TTLC	500	500	10000	75	100	500		8000	2500	1000	20	3500	2000	100	500	700	2400	5000			
STLC	15	5	100	0.75	1	5		80	25	5	0.2	350	20	1	5	7	24	250			
B3-5(Total)	ND<1.0	0.96	28	0.14	0.08	6.1	ND<1.0	2.2	17	1.4	ND>0.02	0.11	4	ND<0.1	ND<0.05	ND<1.0	12	19	3400	9300	139
B3-20(Total)	ND<1.0	0.89	14	0.07	0.06	6.5	ND<1.0	1.3	13	0.86	ND>0.02	0.05	3.9	ND<0.1	ND<0.05	ND<1.0	6.8	9.8	2200	4000	55
B4-5(Total)	ND<1.0	0.92	27	0.13	0.08	5.8	ND<1.0	2.3	3.3	1.4	ND>0.02	0.08	3.8	ND<0.1	ND<0.05	ND<1.0	11	10	3200	7800	150
B4-20(Total)	ND<1.0	1.1	21	0.11	0.07	5.4	ND<1.0	1.8	6.7	1.4	0.02	0.1	3.6	ND<0.1	ND<0.05	ND<1.0	8.5	14	3100	5200	130
B5-5(Total)	ND<1.0	0.69	46	0.14	0.06	6.1	ND<1.0	2.5	4.4	1.4	ND<0.02	0.17	5.5	ND<0.1	ND<0.05	ND<1.0	10	11	3400	7500	150
B5-20(Total)	ND<1.0	1.2	30	0.19	0.07	9.3	ND<1.0	3.5	4.4	1.5	ND<0.02	0.16	5.9	ND<0.1	ND<0.05	ND<1.0	13	12	5000	8100	170
B5-20A(Total)	ND<1.0	1.4	33	0.21	0.08	10	ND<1.0	3.5	4.4	1.6	ND<0.02	0.14	5.9	ND<0.1	ND<0.05	ND<1.0	14	12	5200	8400	180
B6-5(Total)	ND<1.0	270	26	0.16	ND<0.05	4.7	ND<1.0	3.2	6.4	1.3	0.05	0.17	4.4	ND<0.1	ND<0.05	ND<1.0	9.7	14	3000	5900	150
B6-5(WET)		17																			
B6-20(Total)	ND<1.0	5.9	11	0.06	ND<0.05	3.1	ND<1.0	0.7	2.6	0.79	0.02	0.1	2.8	ND<0.1	ND<0.05	ND<1.0	3.8	5.2	1200	2500	24
B6-20A(Total)	ND<1.0	1.2	19	0.13	ND<0.05	5	ND<1.0	1.2	4.8	1.1	ND<0.02	0.17	4.1	ND<0.1	ND<0.05	ND<1.0	6.5	9	2700	3800	60

TABLE 6.4
RESULTS OF LABORATORY ANALYSES

Sample Totals WET	Sb mg/kg mg/L	As mg/kg mg/L	Ba mg/kg mg/L	Be mg/kg mg/L	Cd mg/kg mg/L	Cr mg/kg mg/L	Cr HEX mg/kg mg/L	Co mg/kg mg/L	Cu mg/kg mg/L	Pb mg/kg mg/L	Hg mg/kg mg/L	Mo mg/kg mg/L	Ni mg/kg mg/L	Se mg/kg mg/L	Ag mg/kg mg/L	Tl mg/kg mg/L	V mg/kg mg/L	Zn mg/kg mg/L	Al mg/kg mg/L	Fe mg/kg mg/L	Mn mg/kg mg/L
TTLC	500	500	10000	75	100	500		8000	2500	1000	20	3500	2000	100	500	700	2400	5000			
STLC	15	5	100	0.75	1	5		80	25	5	0.2	350	20	1	5	7	24	250			
HB1-1(Total)	2.8	1.5	32	0.23	0.06	5	ND<1.0	1.8	21	4	0.06	0.59	4.4	ND<0.1	0.14	ND<1.0	8.8	46	1800	4600	500
HB1-5(Total)	ND<1.0	0.99	36	0.14	ND<0.05	5.3	ND<1.0	2.2	9.9	2.6	ND<0.02	0.26	4	ND<0.1	ND>0.05	ND<1.0	7.9	16	2200	4300	110
HB2-1(Total)	25	6.3	28	0.16	2.1	12	ND<1.0	3.1	22	7.5	0.26	7.6	22	0.1	0.09	ND<1.0	9.7	67	2600	12000	180
HB2-5(Total)	9	47	21	0.12	0.14	4.8	ND<1.0	2.4	8.7	55	0.15	0.2	4	ND<0.1	0.15	ND<1.0	8	14	1900	4100	87
HB2-5(WET)																					
HB3-1(Total)	ND<1.0	0.98	23	0.15	0.05	4.1	ND<1.0	1.8	2.8	1.5	ND<0.02	1.1	3.2	ND<0.1	ND<0.05	ND<1.0	9.9	8.2	3100	5300	110
HB3-5(Total)	ND<1.0	1.2	13	0.11	ND<0.05	3	ND<1.0	1.1	23	1.6	0.03	0.25	2.2	ND<0.1	ND<0.05	ND<1.0	6.4	16	1900	3600	39
HB4-1(Total)	17.1	24	63.1	1	0.8	10.6	ND<1.0	5.2	613	77.7	0.07	ND<2.0	20.4	1.6	ND<0.98	ND<1.0	15.6	847	ND<9.8	6320	263
HB4-1(WET)									6.6	3.2								90			
HB4-5(Total)	30.8	480	34.5	ND<0.2	ND<0.5	4.1	ND<1.0	2.1	10.7	ND<5.0	0.04	ND<2.0	ND<4	0.09	ND<0.99	ND<1.0	8.8	19	1780	3970	150
HB4-5(WET)		57																			
HB5-1(Total)	334	79	58.8	0.84	2.1	36	ND<1.0	3.6	196	118	0.07	3.1	7.5	5.6	ND<0.99	ND<1.0	10.8	1020	3020	5390	169
HB5-1(WET)	28	3.1																			
HB5-5(Total)	87.8	20	22.5	ND<0.19	ND<0.48	4.1	ND<1.0	2.3	9.9	ND<4.8	0.11	ND<1.9	3.9	120	ND<0.96	ND<1.0	6.3	46.6	1590	3340	55.6

TABLE 6.5.1
RESULTS OF LABORATORY ANALYSES

Sample	Sb mg/L	As mg/L	Ba mg/L	Be mg/L	Cd mg/L	Cr mg/L	Cr HEX mg/L	Co mg/L	Cu mg/L	Pb mg/L	Hg mg/L	Mo mg/L	Ni mg/L	Se mg/L	Ag mg/L	Tl mg/L	V mg/L	Zn mg/L	Al mg/L	Fe mg/L	Mn mg/L
MCL's		0.05	1		0.01	0.05				0.05	0.002			0.01	0.05						
MW1	ND<0.1	3.2	ND<0.02	ND<0.01	ND<0.01	ND>0.02	ND<0.05	ND<0.02	ND<0.05	ND<0.05	ND<0.001	ND<0.02	0.02	0.02	ND<0.01	ND<0.3	ND<0.02	ND<0.02	0.17	ND<0.05	0.06
MW2	ND<0.1	12	ND<0.02	ND<0.01	ND<0.01	0.21	0.17	ND<0.02	ND<0.05	ND<0.05	ND<0.001	0.05	0.06	0.24	ND<0.01	ND<0.3	0.05	0.04	0.49	0.15	3.3
MW3	0.84	9.8	0.07	ND<0.01	ND<0.01	ND>0.02	ND<0.05	ND<0.02	ND<0.05	ND<0.05	ND<0.001	ND<0.02	ND<0.02	0.19	ND<0.01	ND<0.3	0.04	0.03	0.51	0.05	ND<0.02
MW4	ND<0.1	0.005	0.49	ND<0.01	ND<0.01	0.1	0.09	ND<0.02	ND<0.05	ND<0.05	ND<0.001	ND<0.02	ND<0.02	ND<0.01	ND<0.01	ND<0.3	ND<0.02	ND<0.02	1.1	ND<0.05	ND<0.02
MW5	ND<0.1	140	0.03	ND<0.01	ND<0.01	ND>0.02	ND<0.05	ND<0.02	ND<0.05	ND<0.05	ND<0.001	0.1	0.03	0.02	ND<0.01	ND<0.3	0.13	0.02	0.6	0.41	0.08
MW6	ND<0.1	25	0.03	ND<0.01	ND<0.01	0.23	0.23	ND<0.02	ND<0.05	ND<0.05	ND<0.001	0.05	0.07	0.03	ND<0.01	ND<0.3	0.04	0.11	1.9	1.8	1.9
MW7																					
MW8	ND<0.1	ND<0.005	0.03	ND<0.01	ND<0.01	0.02	ND<0.05	ND<0.02	ND<0.05	ND<0.05	ND<0.001	ND<0.02	0.06	0.01	ND<0.01	ND<0.3	ND<0.02	0.04	2.2	2.1	0.42
FIELD BLANK MW9	ND<0.1	ND<0.005	ND<0.02	ND<0.01	ND<0.01	ND>0.02	ND<0.05	ND<0.02	ND<0.05	ND<0.05	ND<0.001	ND<0.02	0.03	ND<0.01	ND<0.01	ND<0.3	ND<0.02	ND<0.02	ND<0.1	ND<0.05	ND<0.02

TABLE 6.6

MONITORING WELLS REFERENCE ELEVATIONS, DEPTHS TO GROUNDWATER (12/15/89 and 1/9/90), AND GROUNDWATER ELEVATIONS

Well	Reference Elevation (feet above MSL)	Depth to Water(12/15/89) (feet)	Groundwater Elevation (feet above MSL)	Depth to Water(1/9/90) (feet)	Groundwater Elevation (feet above MSL)
W-1	102.06	82.70	19.36	82.72	19.34
W-2	98.79	81.82	16.97	81.80	16.99
W-3	94.17	71.83	22.34	71.52	22.65
MW-4	92.17	71.40	20.77	71.45	20.72
MW-5	92.75	76.94	15.81	77.03	15.72
MW-6	98.15	81.95	16.20	81.86	16.29
MW-7	107.90	89.70	18.20	89.72	18.18
MW-8	102.38	85.44	16.94	85.44	16.94

TABLE 6.5.2

RESULTS OF LABORATORY ANALYSES

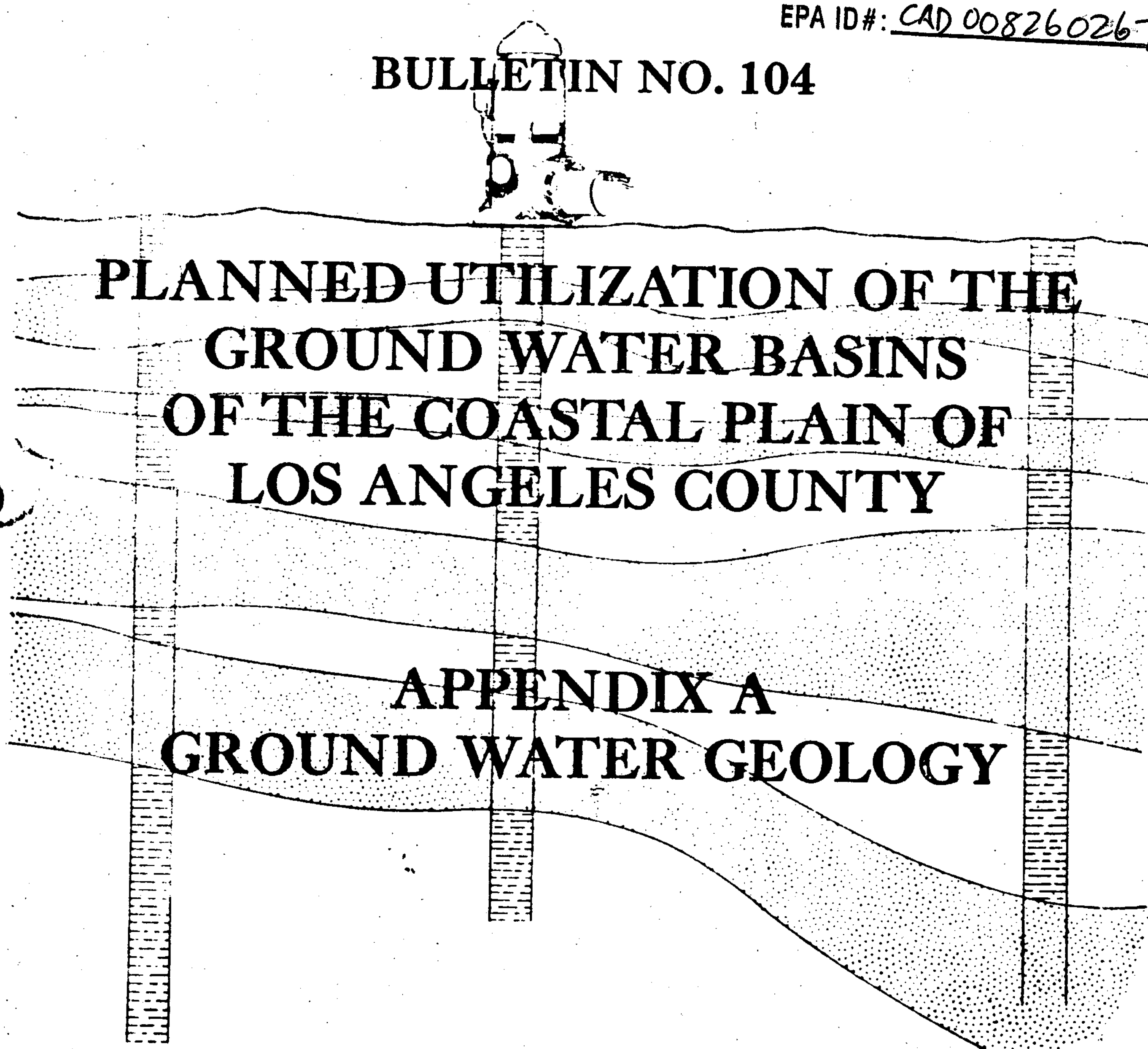
Sample	PCE ug/L	TCE ug/L	TOLUENE ug/L	XYLENES ug/L	ETYHL-BENZENE ug/L	ACETONE ug/L	2-BUTANONE ug/L	11-DCE ug/L	111-TCA ug/L	TRICHLOROFLUORO-METHANE ug/L	CARBON-TETRACHLORIDE ug/L
MCL	5	5.		1750	680			5	200	150	.5
MW1	200	370	ND<5	ND<5	ND<5	ND<10	ND<10	19	12	ND<5	ND<5
MW2	16	40	18	ND<5	ND<5	ND<10	ND<10	ND<5	ND<5	ND<5	ND<5
MW3	160	120	6	ND<5	ND<5	ND<10	ND<10	ND<5	ND<5	ND<5	ND<5
MW4	ND<5	190	39	40	6	74	12	ND<5	ND<5	ND<5	ND<5
MW5	ND<5	18	270	300	39	ND<10	ND<10	ND<5	ND<5	ND<5	ND<5
MW6	ND<5	110	ND<5	ND<5	ND<5	ND<10	ND<10	8	10	73	43
MW7											
MW8	25	88	ND<5	ND<5	ND<5	ND<10	ND<10	5	ND<5	ND<5	ND<5
FIELD BLANK	ND<5	ND<5	ND<5	ND<5	ND<5	ND<10	ND<10	ND<5	ND<5	ND<5	ND<5
MW9	X							X			X

REFERENCE # 2

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN DISTRICT

Reference #: 9
Site Name: H. KRAMER
EPA ID#: CAD 008260267

BULLETIN NO. 104



PLANNED UTILIZATION OF THE GROUND WATER BASINS OF THE COASTAL PLAIN OF LOS ANGELES COUNTY

APPENDIX A
GROUND WATER GEOLOGY

EDMUND G. BROWN
Governor

WILLIAM E. WARNE
Director

This area consists of several small alluvial fans deposited by streams draining the Puente Hills. These fans coalesce forming an undulating surface that slopes to the south and southwest with a gradient of about 170 feet per mile. This area has been more extensively dissected than has the Hollywood piedmont slope. As a result of this dissection, the topographic expression of the La Habra piedmont slope is quite complex. Some of the exposed features are probably of the same age as the Santa Fe Springs Plain and the Montebello Plain, that is, of upper Pleistocene age. Many younger fans of shallow depth cover portions of the area.

Downey Plain and Related Features

The Downey Plain, the largest area of Recent alluvial deposition, is located south and southeast of the La Brea, Montebello, and Santa Fe Springs Plains, and of the Coyote Hills, and northeast of the Newport-Inglewood belt of hills (Poland, et al., 1956). It extends from Ballona Gap across the central lowland of the Coastal Plain of Los Angeles County into the Coastal Plain of Orange County nearly to Santa Ana. The Downey Plain ranges in elevation from 275 feet in the Los Angeles Narrows and 200 feet in the Whittier Narrows to sea level at the ocean near Dominguez Gap. The slope of the Downey Plain varies from 7 to 23 feet per mile, but is generally less than 18 feet per mile. It is essentially a depositional feature, although minor erosion has occurred. Alluvial fans formed by the Los Angeles and Rio Hondo-San Gabriel River systems have coalesced to form a very gentle plain. During past flood times these large rivers have swung over most of the area depositing their debris. Near the ocean some of the stream deposited sediments are interbedded with marine and tidal sands, gravels, and clays.

Ballona Gap, located between the Baldwin Hills and Beverly Hills and extending to the ocean, was initially formed by headward erosion from the ocean, capturing drainage from the Sawtelle Plain and the Hollywood piedmont slope. Although the Los Angeles River has flowed through the Gap, available evidence indicates that it has caused less erosion than the smaller streams.

Dominguez Gap includes the lower portion of the Los Angeles River area between Dominguez and Signal Hills. It is about two miles wide and slopes toward the ocean at a gradient of about four feet per mile.

Alamitos Gap, separating Long Beach Plain and Bixby Ranch Hill from Landing Hill, has been eroded by Coyote Creek and presumably other streams. The surface slopes oceanward at the same gradient as Dominguez Gap.

The Los Angeles Narrows, located between the Elysian and Repetto Hills, is an erosional feature cut through a relatively weak portion of the Santa Monica Mountains by the Los Angeles River. Terraces and complex subsurface alluvial deposits indicate that erosion and deposition has been complex in the Narrows.

The Whittier Narrows separates the Merced and Puente Hills and forms the avenue through which drainage from the San Gabriel Valley and surrounding highlands passes to the coastal plain. The two major streams passing through Whittier Narrows are the Rio Hondo and the San Gabriel River. The width of the Whittier Narrows varies from 1.6 miles to 2 miles. Although generally flat with steep sides, the surface configuration of the Narrows is further complicated by terraces, alluvial fans from local small canyons, and abandoned stream courses and meanders. This physiographic for[illegible] coastal-dune belt and may also serve as a permeable conduit for sea-water intrusion into aquifers near the surface along the coast.

Playa lake deposits found near the intersection of the Coast Highway and Vermont Avenue, about one mile west of Wilmington, have been deposited in shallow closed depressions. Standing water accumulates in these closed drainage areas after heavy rains. These deposits are usually fine-grained sands, silts, and clays.

Lagoonal marshlands extend along the coastal reaches of the Los Angeles and San Gabriel Rivers and Ballona Creek for a distance of one-half to three miles inland. Deposits in these areas appear to be heterogeneous in nature, lenticular, and mostly fine-grained. These sediments may also include medium sand, silty sand, clay and peat deposits.

Active Dune Sand. Wind-blown sands occur in a narrow strip 0.2 to [illegible] miles inland and parallel to the coast and continue from Ballona Escarpment southward to Redondo Beach for a distance of about nine miles. These deposits are known as the Active Dune Sands. Plate 3B shows the extent of these deposits which are identified by the symbol Qsr. These eolian deposits are lenticular, and composed of fine to medium, white or grayish sand, usually well sorted. These sediments may also include medium sand, silty sand, clay and peat deposits. The Active Dune Sands range up to 70 feet in thickness. Being above the zone of saturation, the sands do not yield water to wells. However, they are relatively permeable and water held in closed depressions after heavy rains does percolate vertically downward and laterally. The dune sands may therefore serve as recharge media to any water bodies that underlie this area.

Pleistocene Series

The Pleistocene series is divided into upper Pleistocene and lower Pleistocene in most of coastal California, primarily because they are separated by an angular unconformity in many uplift areas. Fossils are used as an additional index to separation of the Pleistocene series. The boundary between deposits of Pliocene and Pleistocene age is difficult to determine and consequently is somewhat arbitrary in many areas.

In the coastal plain the upper Pleistocene is represented by the Older Dune Sands and the Lakewood formation, while the lower Pleistocene consists of the San Pedro formation (Poland, et al, 1956). Where they appear on the surface the Older Dune Sands, Lakewood formation, and the San Pedro formation are identified by the symbols Qso, Qlw, and Qsp, respectively. on Plate 3. A small zone of transitional material, cropping out between the San Pedro formation and the underlying Pico formation of Pliocene age is also shown on Plate 3 and identified by the symbol Qsp-Pp.

Older Dune Sand. Dune deposits occur in West Coast Basin which are older than those described under the Recent Series. These wind-blown materials are sufficiently significant in manner of deposition, lithology and topography, to be considered in this report as a separate unit. The term "Older Sand Dunes" has been previously used to designate these wind-blown deposits; however, in this report, the more descriptive term "Older Dune Sand" is used to identify these deposits.

The Older Dune Sand has been described by Poland, (1956, 1959b) and in Calif. D.W.R. 1952a and 1957c. Although these sediments have been previously classed as Recent materials, they are now considered to be of late Pleistocene age.

The Older Dune Sand covers an area three to four miles wide and about 13 miles long extending along the Santa Monica Bay Coast line south of Ballona Escarpment. Surface exposures and well logs indicate that the dune sediments cover the Ocean Park Plain as well as a portion of the West Coast Basin. In the Ballona Creek area the older dunes have been removed. In the West Coast Basin the Older Dune Sand together with the Active Dune Sand form the El Segundo Sand Hills.

The Older Dune Sand consists of fine to medium sand with minor sandy silt, clay, and gravel lenses. Within the weathered zone the materials are yellow to brown in color although the unweathered formation in place is white, gray and black in color. The Older Dune Sand generally consists of three divisions: a deeply weathered surface, an intermediate horizon of clean sands and basal beach sands and gravels, and a lowermost horizon which apparently includes a zone of transition to the underlying Bellflower aquiclude.

Cross-bedding, and fossils in exposures near the Hyperion Sewage Treatment Plant at El Segundo and elsewhere, indicate that the sands were originally beach deposits with associated coarse gravels. These beach deposits were exposed to the wind by lowering of the sea level, resulting in formation of the present Older Dune Sand. Deep weathering has oxidized the iron minerals which, through cementation and leaching processes, have partially filled the interstices between individual grains, thus reducing the permeability of the weathered Older Dune Sand to some extent. Uplifting may have gently tilted these dunes toward the southwest.

Deep percolation of surface water occurs in most of the Older Dune Sand area, especially where closed depressions occur. Directly beneath these older dunes in part of the El Segundo Sand Hills, the fine sediments of the Bellflower aquiclude restrict downward movement of ground water. However, the aquiclude is missing along the ocean and ground water can move laterally into an area where downward percolation can again occur.

Lakewood formation. The Lakewood formation includes all upper Pleistocene deposits other than the Older Dune Sand. It includes what has previously been termed "terrace deposits", "Palos Verdes sand", and "unnamed upper Pleistocene deposits". Other names which have been used for upper Pleistocene deposits or parts of these deposits include the Sunny Hill formation (Hoskins, 1954,), and [illegible] formation ([illegible], 19[illegible]). These names, however, are awkward for use in the entire coastal plain since the named formations have been described as existing only in the limited associated area. The present designation was selected from a typical section indicated in the log of a well at Lakewood where this formation reaches a maximum thickness of approximately [illegible] feet.

In the upper part of the Lakewood formation lithologic changes are rapid, with discontinuous permeable zones and considerable variation in particle size. No shell zones have been found in the upper part of this formation. These features represent typical stream type alluviation with flood plain fine-grained sediments comprising from 40 to [illegible] percent of the total deposits. In the lower horizons the gravels and coarse sands are confined to a narrow belt extending over the Newport-Inglewood uplift. Gravels range from pea-size to cobbles, three to four inches in diameter. Over the balance of the coastal plain, coarse basal deposits of sand and gravel are fairly continuous with discontinuous lenses of sandy silt and clay. The basal part of the Lakewood formation in the Cheviot Hills area of Beverly Hills has been called the Medill sand by Rodda (1957)..

The Potrero fault is the only known structure that displaces the Exposition aquifer. However, both the Artesia and Exposition aquifers have been affected by folding and show slight warping near the Newport-Inglewood uplift and in the downwarped area of the Central Basin.

Gage Aquifer. The basal or lowest member of the Lakewood formation is termed the Gage aquifer. The name "200-foot sand" was applied to this aquifer by Poland, et al (1948 and 1959a), later by Richter (1950) and in the "Report of Referee", (Calif. D.W.R. 1952a). Originally the designation of the "200-foot sand" was used because the aquifer occurred about 200 feet below land surface in the syncline extending from Inglewood southeasterly through Gardena. In the Central Basin the base of the aquifer varies from 100 to over 350 feet below the surface; consequently the term "200-foot sand" is inapplicable. The lowest elevation this aquifer attains is in the vicinity of Lynwood, where an elevation of 350 feet below sea level occurs. The Gage aquifer extends over most of the Coastal Plain of Los Angeles County, although insufficient data is available to verify its extension beneath the Santa Monica Plain. Contours on the base of the aquifer are shown on Plate 12.

The composition of the Gage aquifer varies from a fine to medium sand with variable amounts of gravel, sandy silt, and clay in the West Coast Basin, to a coarse yellow sand and minor gravel (two to four inches in diameter) in the center of the Central Basin, and to a fine yellow sand and gravel toward the Whittier Narrows region. The thickness varies from 10 feet to a maximum of 160 feet in the Torrance area. The thickness of the aquifer is shown on Plate 13, "Lines of Equal Thickness of the Gage and Gardena Aquifers".

Deposits that comprise this aquifer are of both marine and continental origin. Along the northerly boundary of the Central Basin, that is, along the base of the Santa Monica Mountains and the Elysian and Repetto Hills, the deposits appear to be continental in origin. In the southeastern half of the coastal plain the aquifer consists mainly of mixed continental and marine, or in some areas, solely marine sediments.

Subsurface structures which either cut the aquifer or against which the aquifer terminates are shown on Plate 12. Areas where the aquifer is merged with overlying aquifers are also shown on this plate.

While this aquifer generally consists of sand, wells have been perforated in it only in areas where coarser materials exist. Approximately 200 wells have been drilled into the Gage aquifer in the West Coast Basin in the vicinity of Gardena but it is unimportant as a producing aquifer in other areas.

Gardena Aquifer. In 1950 Richter described the coarse deposits comprising this aquifer within the West Coast Basin under the term "Gardena Water-bearing Zone". In "Report of Referee" (Calif. D.W.R. 1952a) the description of the Gardena Water-bearing Zone was further elaborated. In the present investigation the extent of the Gardena water-bearing zone in the Central Basin was determined and these deposits have been designated the "Gardena aquifer". This term now applies to all of the coarse deposits that are contemporaneous with the Gage aquifer (fine grained deposits) in both the Central and West Coast Basins.

The Gardena aquifer extends inland from Redondo Beach beneath the City of Gardena, across the Newport-Inglewood uplift and into the Central Basin, where it loses its identity near Lynwood. Further inland, identical plicable in other areas where the Lynwood aquifer is merged with the overlying aquifers because of the greater depth of those aquifers as well as the Lynwood aquifer below the surface, the lack of continuous permeable materials to conduct water vertically downward, and the lack of available space for large surface pits. In these areas, therefore, other methods of recharge would be necessary, such as injection wells drilled into and perforated in this aquifer.

Silverado Aquifer. The Silverado aquifer is the name applied in this report to those water-bearing materials which are stratigraphic equivalents of the "Silverado Water-Bearing Zone" in the West Coast Basin. Originally named by Poland, et al (1956), from its typical occurrence in a ℓl in Silverado Park, Long Beach, the Silverado Water-Bearing Zone has een found throughout the rest of the Coastal Plain of Los Angeles County and extends across the Los Angeles County line into Orange County. For the purpose of this report the term, "Silverado aquifer", will apply to these materials throughout the Coastal Plain of Los Angeles County. Areas of Pleistocene deposits occurring in the Santa Monica and San Pedro shelves offshore may be continuations of the Silverado and underlying Sunnywide aquifers. Plate 20 shows the known extent and elevation contours of the base of the Silverado aquifer.

Sediments comprising the Silverado aquifer are both continental and marine. Where continental deposits predominate, yellow to brown, coarse to fine sands and gravels are interbedded with yellow to brown silts and clays. Marine deposits which comprise the Silverado aquifer over the mainder of the basin are primarily blue to grey sand, gravel, silt, and lay. Some black sands, quicksand, marine shells, peat, and wood fragments are also shown on drillers logs of wells located in the area of marine sediments. In the West Coast Basin, Richter (1950) describes the lithology as fine to coarse, blue-black arkosic sand with the larger grains composed of granite, granodiorite, and diorite. Along the flanks of the Palos Verdes Hills, limestone and schist pebbles are abundant, while in the Ballona Gap area slate, schist, and volcanic pebbles are commonly found.

The ancestral Rio Hondo and San Gabriel River systems have been the major transporting agent for materials comprising the continental portion of the Silverado aquifer in Central Basin, although some contributions may have been added by the Santa Ana River flowing in one of its earlier courses. The regional evidence indicates that the Los Angeles River did not flow into the coastal plain during much of the lower Pleistocene time and probably did not contribute sediment to the Silverado aquifer. However, streams flowing from the Santa Monica Mountains, Elysian Hills, and Palos Verdes Hills have added debris from these areas. Much of this material was deposited beneath the shallow ocean that covered the coastal plain at this time. The continental deposits appear to have been laid down when the sea was retreating from the coastal plain.

The varying thickness of the Silverado aquifer is depicted on Plate 21, "Lines of Equal Thickness of the Silverado Aquifer". This aquifer reaches a maximum thickness of 500 feet between the Wilmington anticline and the Cherry Hill fault. One mile west of Lakewood, along Carson Street, the Silverado aquifer is 450 feet thick. Along the south side of the Santa Fe Springs Plain and also two miles southeast of Huntington Park it is 300 feet thick.

The maximum depth reached by the base of the Silverado aquifer, 1200 feet below sea level, is found southwest of the Cherry Hill fault

..thin Dominguez Gap, along the north side of the Los Alamitos fault, and about three miles southeast of Norwalk. A depth of 1100 feet below sea level occurs near Long Beach Harbor.

The Silverado aquifer crops out along the northeast flank of the Palos Verdes Hills, possibly on the continental shelf beneath Santa Monica Bay, along the southern margin of the Baldwin Hills, in the Repetto and Merced Hills, along the south slope of the Puente Hills, and possibly in the Coyote Hills. Outcrops in the areas named are shown as the San Pedro formation, Qsp on Plate 3, because insufficient data are available to definitely identify the aquifer involved.

Areas where the Silverado aquifer merges with overlying aquifers are shown on Plate 20. In the Montebello Forebay Area and Whittier Narrows he Silverado aquifer is directly overlain by and merges with aquifers younger than the Lynwood aquifer. Merged areas are irregular in extent but are generally found along the Newport-Inglewood uplift, in the area from Huntington Park to Santa Fe Springs, and also within the Whittier Narrows. In the West Coast Basin the Silverado is merged with the overlying Lynwood aquifer everywhere except beneath the Gardena syncline and the Wilmington anticline. Near Santa Monica Bay the Silverado aquifer is in hydraulic continuity with the Gardena and Gage, as well as the Lynwood aquifers. In the Montebello Forebay Area the Silverado aquifer merges with the overlying Lynwood, Jefferson, Hollydale and Gardena aquifers, as delineated on Plate 20A.

The Silverado aquifer has suffered a greater degree of folding than the overlying Lynwood aquifer. It has been deformed by all of the major anticlinal and synclinal folds. All the major faults shown on Plate 3 seem to have affected this aquifer. After faulting occurred, the aquifer may be found at either different or the same elevation but separated by a region of altered permeability. Sufficient data is lacking to determine whether the geologic structure just south of Santa Fe Springs is a fault or downfold. On the basis of the data available it is believed that the postulation of a sharp downfold would explain the existing structure in a more adequate manner than the assumption of a fault.

This aquifer is one of the most important ground water producers in the coastal plain. Specific capacities of wells perforated in it range up to a maximum of 159 gallons per minute per foot of drawdown and yields range up to 4700 gallons per minute.

In the Whittier Narrows the Silverado aquifer is merged with many overlying aquifers and recharging the shallow aquifers in that area would cause additional water to reach the Silverado aquifer. Recharge from the surface in the Los Angeles Forebay Area may also reach the Silverado aquifer where it is truncated by the Gaspur. Other possible recharge areas for the Silverado aquifer are in the outcrop along the Coyote and Baldwin Hills, or in the Ballona Gap, where the Silverado aquifer is directly beneath the Ballona aquifer and close to the surface. Natural recharge takes place in those areas shown on Plate 3 where the San Pedro formation crops out on the surface.

Sunnyside Aquifer. The water-bearing materials occurring within the Central Basin beneath the Silverado aquifer but above the Pico formation have been termed the "Sunnyside aquifer" after a typical occurrence illustrated by the log of a well located in Sunnyside Cemetery in North Long Beach.

The Sunnywide aquifer extends throughout the Central Basin. Its extent and elevation of its base are shown on Plate 22, "Lines of Equal

Geologic Features

Physiographic features of the West Coast Basin are the Torrance and Long Beach Plains, the El Segundo Sand Hills, the Dominguez and Alamitos Gaps, and portions of the Baldwin Hills, the Rosecrans Hills, Dominguez Hill, Signal Hill, and the Palos Verdes Hills (Plate 2). The continuity of the Newport-Inglewood belt of hills, which flanks the West Coast Basin on the northeast, is broken by Dominguez and Alamitos Gaps, which are stream-cut channels eroded and backfilled by ancestral rivers. Most of the basin consists of a gentle, poorly drained plain flanked by the partly eroded highland areas of the Newport-Inglewood belt of hills and the heavily eroded Palos Verdes Hills. Toward Santa Monica Bay, a wide belt of sand dunes, containing many closed depressions, form the El Segundo Sand Hills.

Sediments of the Recent Series and the Lakewood and San Pedro formations of the Pleistocene Series have been identified within the West Coast Basin. The principal aquifers in these series are discussed below.

The Recent Series has two main divisions - the Active Dune Sand and the Recent alluvium. The Active Dune Sand occurs along the coast bordering Santa Monica Bay and extends inland for a maximum distance of about one-half mile. Some of these dunes are 70 feet thick. The Recent alluvium occurs mainly in the Gardena area and within Dominguez Gap, with a lobe extending northwesterly from Dominguez Gap between Dominguez Channel and Dominguez Hill. Another small sinuous area of alluvium extends into Bixby Slough from San Pedro Harbor. Irregular patches also occur south of Torrance. Members of the Recent alluvium include the Semiperched aquifer, the Bellflower aquiclude, the Gaspur aquifer, and miscellaneous beach, playa lake, and lagoonal marshland deposits.

The Recent portion of the Semiperched aquifer occurs only in Dominguez and Alamitos Gaps. It consists of sand, silty sand, silt and clay. The Semiperched aquifer can be detected in well logs, but water level measurements have been obtained from only a few test holes. Available evidence indicates that water levels in the Semiperched aquifer are generally above water levels in the Gaspur aquifer. Water in the Semiperched aquifer is generally of poor quality.

The Recent part of the Bellflower aquiclude occurs in Dominguez Gap where it overlies the Gaspur aquifer, and ranges in thickness from 40 to 80 feet (Plate 9B). The upper part of the aquiclude is sandy silt or sandy clay.

The Gaspur aquifer, entirely of Recent age, occurs only in Dominguez Gap. It has been slightly deformed over the Cherry Hill fault in such a manner that its base rises to an elevation of 80 feet below sea level. It reaches a maximum known depth of about 140 feet below sea level near Terminal Island (Plate 10B). Through the gap it is 40 to 80 feet thick (see Plate 11B). These coarse sands and gravels are confined and produce large quantities of water. Extensive sea-water intrusion into this aquifer is evidence that it is exposed to the ocean. The connection with the ocean may occur some distance offshore or may be through permeable overlying materials closer to shore or possibly both.

Upper Pleistocene deposits include the Older Dune Sand and the Lakewood formation. The Older Dune Sand occurs in a band from about three to four miles wide inland from Santa Monica Bay, extending from the Ballona Escarpment to the Torrance area. It forms the major part of the El Segundo

Sand Hills. Since deposition, the Older Dune Sand has been tilted, weathered, eroded, and further altered by cementation and leaching processes. Surface water percolates into the dunes from closed depressions after heavy rains. Ground water is not, however, extracted from the Older Dune Sand although some perched water bodies may occur.

Divisions of the Lakewood formation in the West Coast Basin include the Semiperched aquifer, the Bellflower aquiclude, the Gardena aquifer, and the Gage aquifer. Those deposits previously known as Terrace Cover and the Palos Verdes sand constitute that part of the Semiperched aquifer that is of late Pleistocene age. These sediments may have been deposited at the same time as the Artesia-Exposition aquifers in the Central Basin.

Underlying both the Older Dune Sand and the Semiperched aquifer is that part of the Bellflower aquiclude which is of late Pleistocene age; it has been previously called the fine-grained phase of the Unnamed Upper Pleistocene Deposits. In the West Coast Basin, the Bellflower aquiclude overlies most of the Newport-Ingleood uplift and Torrance Plain though it is missing over the Baldwin Hills. It reaches a maximum depth of 140 feet below sea level (Plate 8B) and ranges up to 200 feet in thickness (Plate 9B). This heterogeneous mixture of continental, marine, and wind-blown sediments is generally fine-grained, consisting of silty clays and clays. It also contains lenses of sandy or gravelly clays which may be permeable enough to permit water to move vertically downward from the overlying Semi-perched aquifer to the underlying aquifers. It is not significant as a source of ground water. The Gardens and Gage aquifers are constituted of part of those sediments previously referred to as Unnamed Upper Pleistocene Deposits.

The Gardena aquifer extends westward from Lynwood over the Newport-Inglewood uplift to Redondo Beach. It was deposited by an ancestral stream during a rise in sea level and has since been folded over the uplift. The aquifer is composed of sand and gravel with a few discontinuous lenses of sandy silt. It reaches a maximum depth of 200 feet below sea level (Plate 12B) and is as much as 160 feet in thickness (Plate 13B). Permeability is high in the Gardena aquifer, as evidenced by the many wells which tap this aquifer near the City of Gardena. Yields are high and range from 100 to 1,300 gallons per minute. Recharge to the aquifer occurs primarily in the Downey Plain and water is transmitted through the aquifer into the West Coast Basin. Some additional recharge is received by the Gardena aquifer from the overlying Semiperched aquifer and Active Dune Sand, and from the Gage aquifer, with which it is in hydraulic continuity.

The Gage aquifer (previously known as the "200-foot sand") extends over most of the West Coast Basin except for the Long Beach Plain. It is merged with the underlying aquifers near Torrance and south of the Ballona Escarpment along Santa Monica Bay. Except for local areas the Gage aquifer is confined by the Bellflower aquiclude. In the vicinity of Torrance, the Gage aquifer reaches a depth of 250 feet below sea level (Plate 12B) and attains a thickness of 160 feet (Plate 13B). It is composed chiefly of sand with minor amounts of gravel and thin beds of silt and clay. The aquifer exhibits moderate to low permeability and therefore is of secondary importance as a ground water producer in the West Coast Basin. The few wells extracting from this aquifer supply water for domestic and irrigation purposes.

Lower Pleistocene deposits are represented in the West Coast Basin by the San Pedro formation, which is of marine origin. The San Pedro formation includes two main aquifers, the Lynwood and the Silverado. Outcrops of the San Pedro formation occur on the Baldwin Hills, along the northeastern margin of the Palos Verdes Hills, and on Signal Hill. Portions of the Santa Monica and San Pedro shelves in the ocean are underlain by it. The San Pedro formation thickens along the Gardena syncline from 400 feet near Ballona Gap to more than a thousand feet in Dominguez Gap. It has been offset by the Charnock, Inglewood, Potrero, Avalon-Compton, Cherry Hill and Northeast Flank faults.

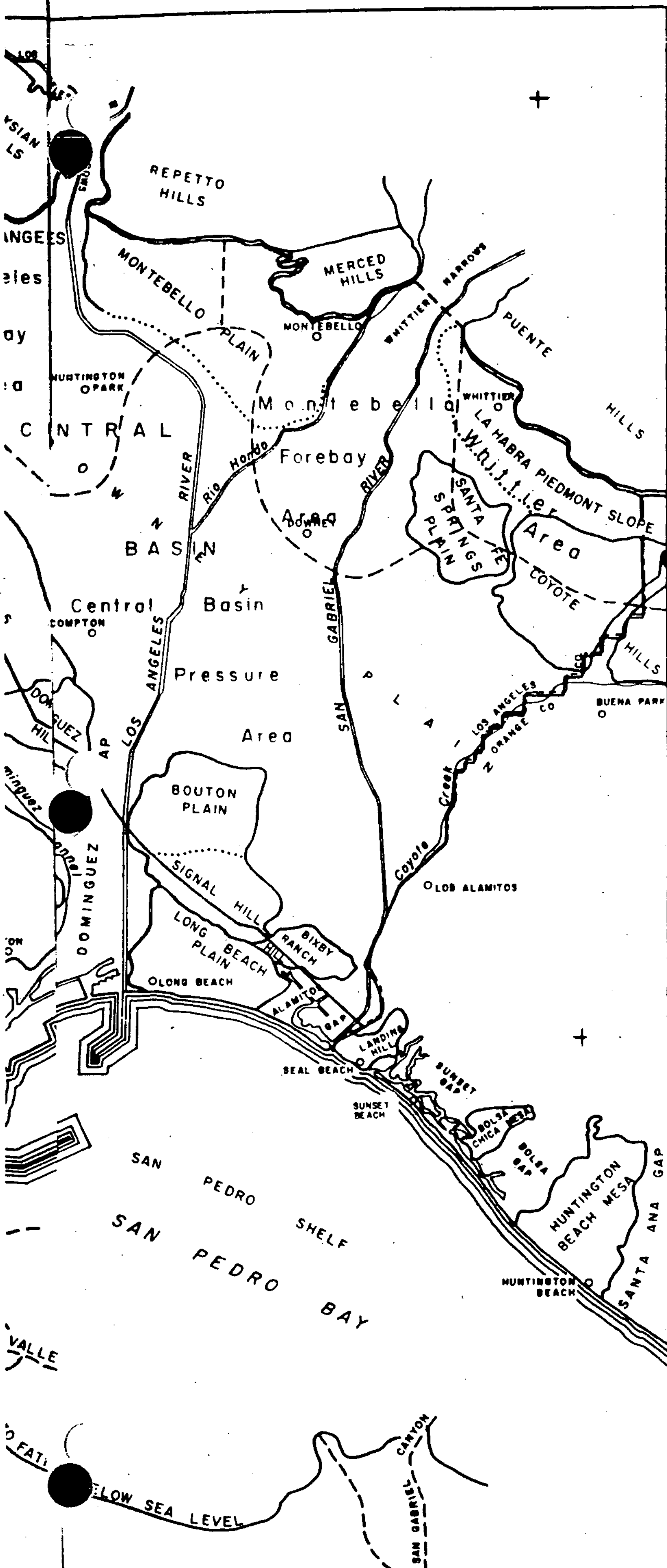
The uppermost aquifer of the San Pedro formation in West Coast Basin, the Lynwood aquifer (previously known as the "400-foot gravel"), is composed, in the northern and central parts of the basin, of sand and gravel with lesser amounts of sandy silt, silt, and clay. South of Gardena the gravel is missing and the aquifer consists mainly of sand and sandy silt. The Lynwood aquifer attains its maximum thickness of 200 feet one mile west of the intersection of Alameda Street and Sepulveda Boulevard (Plate 19B). Just one mile northwest of Gardena it reaches its greatest depth, 550 feet below sea level (Plate 18B). The Lynwood aquifer is confined throughout the West Coast Basin except in those areas where it merges with the overlying Gage aquifer (Plate 18B). It also merges with the underlying Silverado aquifer along Santa Monica Bay and along the Newport-Inglewood uplift.

About ten percent of the wells in West Coast Basin are perforated in the Lynwood aquifer. These wells are located primarily in the Torrance, Compton, and Inglewood areas. Few of them draw water solely from the Lynwood aquifer because they are usually perforated in other aquifers as well. Yields of 500 and 600 gallons per minute have been reported.

Deposits of the Silverado aquifer, the lower defined aquifer of the San Pedro Formation in the West Coast Basin, consist of fine to coarse-grained, blue-grey sands and gravels that are continuous over most of the area but are interbedded in some places with discontinuous layers of relatively impermeable sandy silt, silt, and clay. These highly permeable marine deposits reach a maximum thickness of 500 feet (Plate 21B) between the Wilmington anticline and the Cherry Hill fault. The Silverado aquifer reaches its maximum depth at elevation 1,200 feet below sea level (Plate 20B), in Dominguez Gap. It also is most permeable in this area. The Silverado aquifer is merged with the overlying Lynwood aquifer along the coast from Ballona Gap to Redondo Beach, along the north flank of the Palos Verdes Hills, beneath the central and southern part of the Rosecrans Hills and the northern part of Dominguez Hill (Plate 20B). Near Redondo Beach and Hermosa Beach, the merged Lynwood-Silverado aquifers are in hydraulic continuity with the overlying Gardena aquifer; from Hermosa Beach to Ballona Gap, and along the north flank of the Palos Verdes Hills they are in continuity with the Gage aquifer.

Beneath the Silverado aquifer in some parts of the West Coast Basin are 500 to 700 feet of fresh water-bearing materials of the San Pedro and probable Pico formations which have not been identified as an aquifer or aquifers. The approximate elevation of these fresh water-bearing materials is shown on Plate 24B. Along the coast from Redondo Beach to the Ballona Escarpment these deposits are coarse sands and gravels which correspond in age and thickness to the Sunnyside aquifer in the Central Basin. Over the rest of the basin these deposits are fine-grained and act as an aquiclude. The upper division of the Pico formation consists of relatively impermeable

REFERENCE # 3



LEGEND

BOUNDARY BETWEEN PHYSIOGRAPHIC FEATURES (DOTTED WHERE APPROXIMATE OR POORLY DEFINED)

BOUNDARY OF GROUND WATER BASIN

BOUNDARY OF FOREBAY AND WHITTIER AREA

AXIS OF SUBMARINE CANYON

BOUNDARY BETWEEN FOREBAY AND PRESSURE AREA FROM BULLETIN 45 (CALIF. D.W.R. 1934)

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN CALIFORNIA DISTRICT

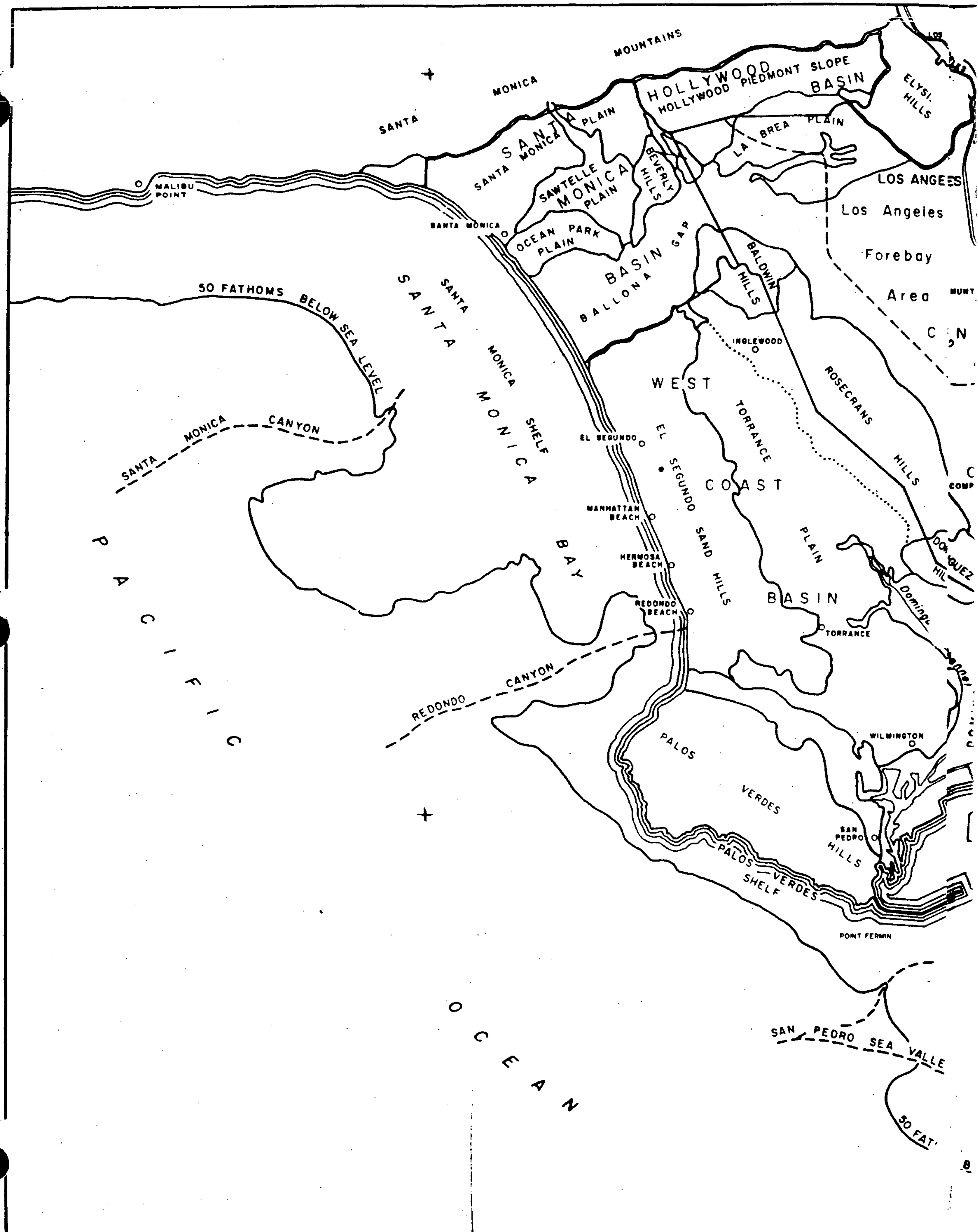
GROUND WATER GEOLOGY OF THE COASTAL PLAIN OF LOS ANGELES COUNTY

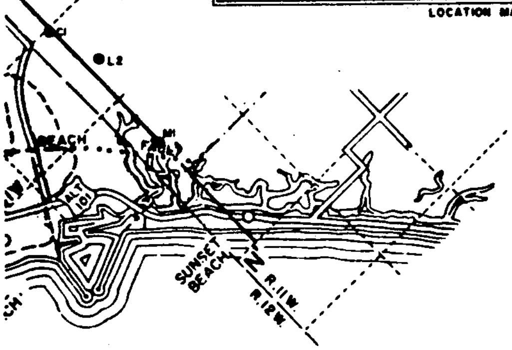
PHYSIOGRAPHIC FEATURES AND GROUND WATER BASINS

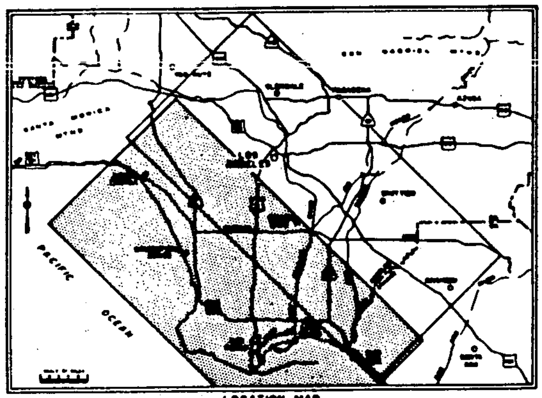
SCALE OF MILES

2 0 2 4

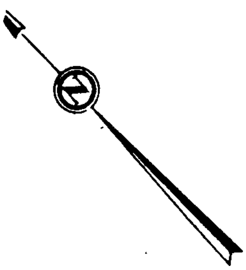
1961


SANTA MONICA MOUNTAINS
HOLLYWOOD BASIN
HOLLYWOOD PIEDMONT SLOPE
ELYSIAN HILLS
SANTA MONICA PLAIN
LA BREA PLAIN
BEVERLY HILLS
SAWTELLE PLAIN
MALIBU POINT
SANTA MONICA
OCEAN PARK PLAIN
BALLONA GAP
BALDWIN HILLS
LOS ANGELES
Los Angeles Forebay Area
50 FATHOMS BELOW SEA LEVEL
SANTA MONICA SHELF
SANTA MONICA BAY
SANTA MONICA CANYON
INGLEWOOD
WEST COAST BASIN
ROSECRANS HILLS
TORRANCE PLAIN
EL SEGUNDO
EL SEGUNDO SAND HILLS
MANHATTAN BEACH
HERMOSA BEACH
REDONDO BEACH
TORRANCE
DOMINGUEZ HILL
REDONDO CANYON
PACIFIC OCEAN
PALOS VERDES HILLS
WILMINGTON
SAN PEDRO
PALOS VERDES SHELF
POINT FERMIN
SAN PEDRO SEA VALLE
50 FAT





LOCATION MAP



LEGEND

SEDIMENTARY ROCKS

QUATERNARY

RECENT

- Qal — ALLUVIUM
  GRAVEL, SAND, SILT, AND CLAY
- Qsr — ACTIVE DUNE SAND
  WHITE OR GREYISH, WELL SORTED SAND

PLEISTOCENE

UPPER

- OLDER DUNE SAND
  FINE TO MEDIUM SAND WITH SILT, AND GRAVEL LENSES
- Qlw — LAKEWOOD FORMATION (INCLUDES "TERRACE DEPOSITS," "PALOS VERDES SAND," AND "UNNAMED UPPER PLEISTOCENE DEPOSITS")
  MARINE AND CONTINENTAL GRAVEL, SAND, SANDY SILT, SILT, AND CLAY WITH SHALE PEBBLES

LOWER

- SAN PEDRO FORMATION (INCLUDES "LA HABRA CONGLOMERATE" AND PART OF "SAUGUS FORMATION")
  MARINE AND CONTINENTAL GRAVEL, SAND, SANDY SILT, SILT, AND CLAY

TERTIARY

- Qsp-Pp — UNDIFFERENTIATED SAN PEDRO FORMATION AND/OR PICO FORMATION
  MARINE, PARTIALLY CONSOLIDATED GRAVEL, SAND, SILT, AND CLAY

PLIOCENE

- Pp — PICO FORMATION
  MARINE SAND, SILT, AND CLAY INTERBEDDED WITH GRAVEL
- REPETTO FORMATION
  MARINE SILTSTONE WITH LAYERS OF SANDSTONE AND CONGLOMERATE

MIOCENE

- (SANTA MONICA MOUNTAINS)
  MODELO FORMATION
  MARINE CONGLOMERATIC SANDSTONE, SANDSTONE, AN
  TOPANGA FORMATION
  MARINE CONGLOMERATE, SANDSTONE, AND SHALE
- (PALOS VERDES HILLS)
  MONTEREY FORMATION
  MUDSTONE, DIATOMITE, AND SHALE
- (ELYSIAN HILLS, REPETTO HILLS, AND PUENTE
  PUENTE FORMATION
  MARINE SILTSTONE, SANDSTONE, SHALE, CONGLOMERAT LIMESTONE, AND TUFF

OLIGOCENE(?)

- VAQUEROS AND SESPE FORMATIONS
  CONTINENTAL RED CONGLOMERATE AND SANDSTONE

EOCENE

- MARTINEZ FORMATION
  MARINE CONGLOMERATE, SANDSTONE, SANDY SHALE, AND SHALE

PALEOCENE(?)

- E-K — UNDIVIDED MARTINEZ AND CHICO FORMATIONS

CRETACEOUS — UPPER

- CHICO FORMATION
  UPPER MARINE MEMBER-HARD CONGLOMERATE, SANDSTONE, AND SHALE
  LOWER CONTINENTAL MEMBER-RED CONGLOMERATE AND SANDSTONE

IGNEOUS AND METAMORPHIC ROCKS

TERTIARY — MIOCENE

- MIDDLE MIOCENE VOLCANIC ROCKS
  VOLCANIC FLOWS, BRECCIAS, TUFFS, AND INTRUSIVES CHIEFLY BASALTIC AND ANDESITIC WITH OCCASIONAL ACID ROCKS GENERALLY ASSOCIATED WITH TOPANGA, MODELO, OR PUENTE FORMATIONS

CRETACEOUS — UPPER

- (SANTA MONICA MOUNTAINS)
  INTRUSIVES OF GRANITE AND GRANODIORITE

JURASSIC

- (PALOS VERDES HILLS)
  CATALINA SCHIST COMPARED WITH FRANCISCAN FORMATION OF THE COAST RANGES VARIED TYPES OF SCHISTOSE ROCKS

TRIASSIC

- SANTA MONICA SLATE
  GREY TO BLACK SLATE, SPOTTED SLATE, MICA SCHIST WITH QUARTZ VEINS

LEGEND

- U/D — FAULT (DASHED WHERE APPROXIMATLY LOCATED; U-UPTHROWN SIDE; D-DOWNTHROWN SIDE)
- U/D — CONCEALED FAULT
- ANTICLINE (DASHED WHERE APPROXIMATLY LOCATED.
- SYNCLINE (DASHED WHERE APPROXIMATLY LOCATED.
- CONTACT (DASHED WHERE APPROXIMATLY LOCATED.
- ● A5 — WELLS USED IN PREPARATION OF GEOLOGIC SECTIONS.
- A———A' — LINE LOCATION OF GEOLOGIC SECTIONS SHOWN ON PLATES 6A THROUGH 6G.

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN CALIFORNIA DISTRICT

GROUND WATER GEOLOGY OF THE COASTAL PLAIN OF LOS ANGELES COUNTY

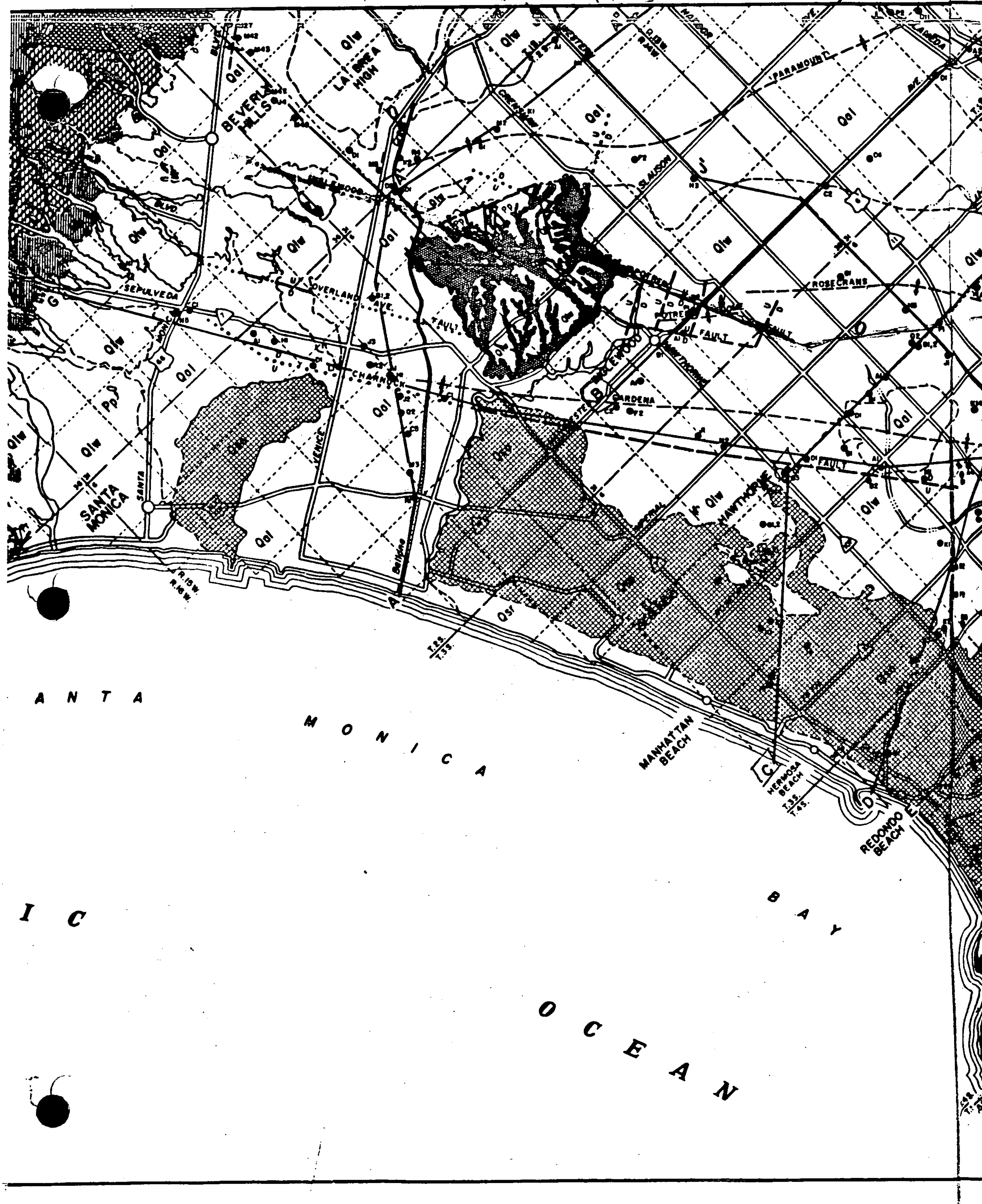
AREAL GEOLOGY

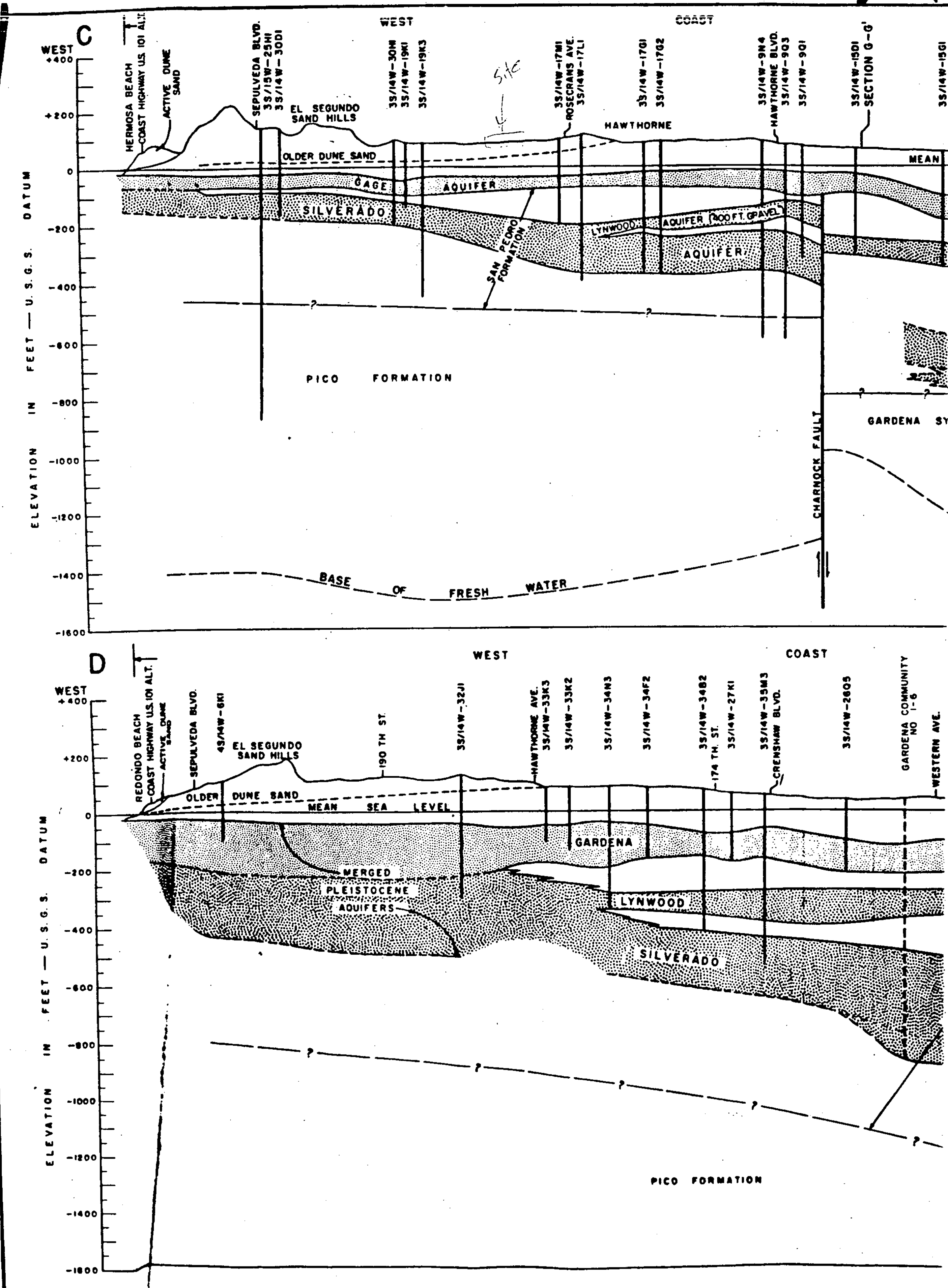
SCALE OF MILES

1 0 1 2 3

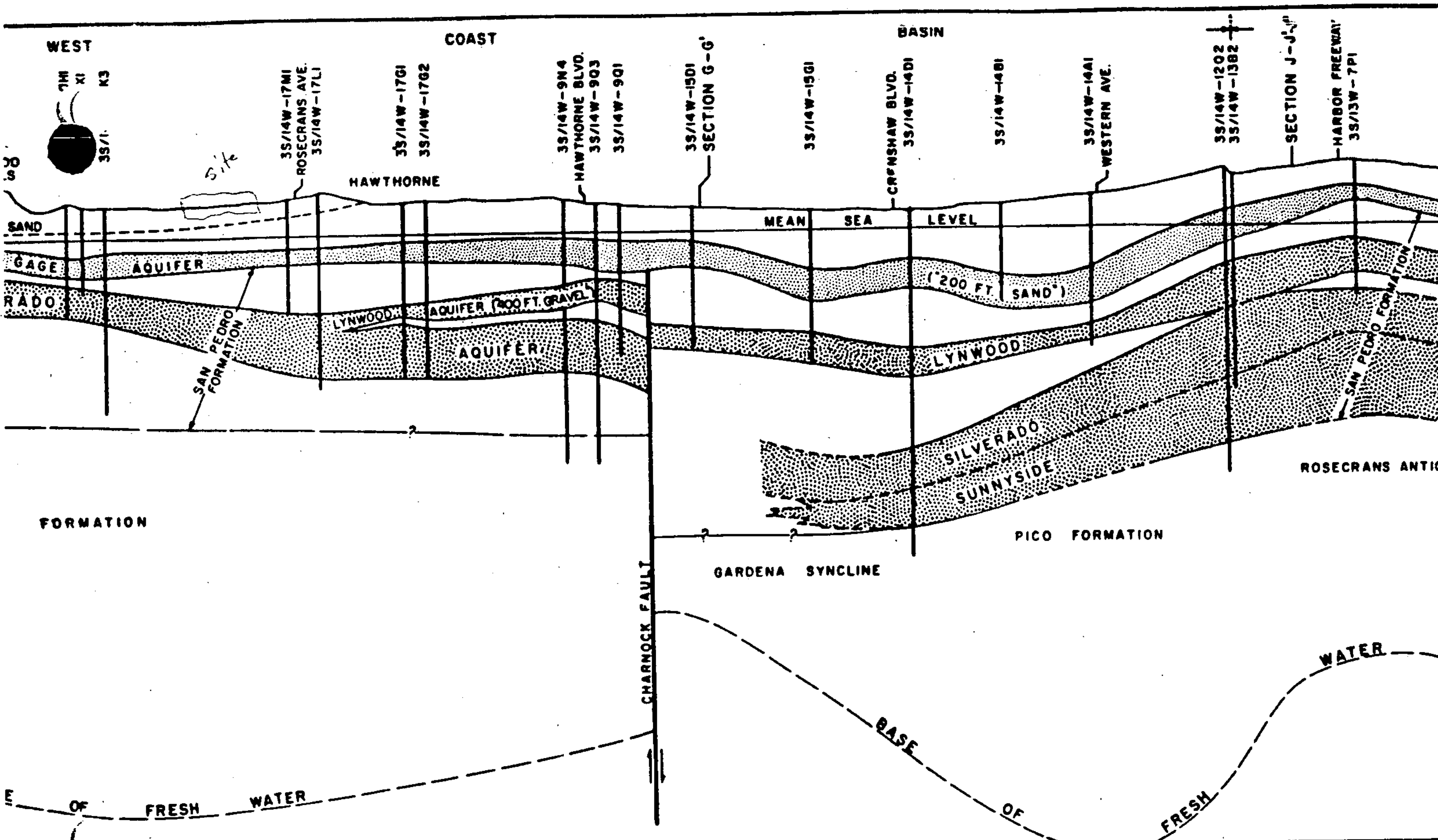
1961

AREAL GEOLOGY S

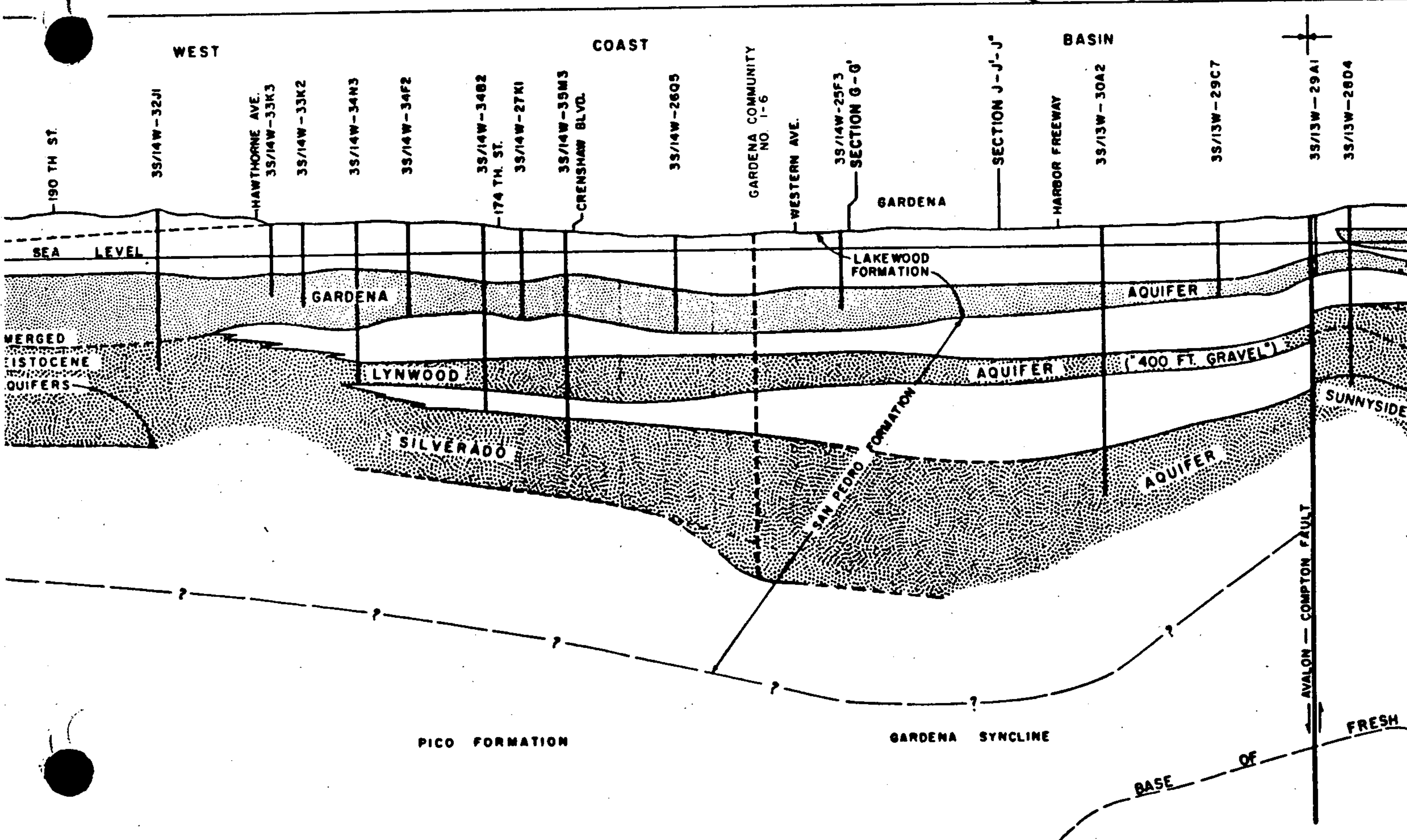



C
WEST
COAST
WEST
+400
+200
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
ELEVATION IN FEET — U. S. G. S. DATUM
HERMOSA BEACH
COAST HIGHWAY U.S. 101 ALT.
ACTIVE DUNE SAND
SEPULVEDA BLVD.
3S/15W-25H1
3S/14W-30D1
EL SEGUNDO SAND HILLS
3S/14W-30M1
3S/14W-19K1
3S/14W-19K3
Site
3S/14W-17M1
ROSECRANS AVE.
3S/14W-17L1
HAWTHORNE
3S/14W-17G1
3S/14W-17G2
3S/14W-9N4
HAWTHORNE BLVD.
3S/14W-9Q3
3S/14W-9Q1
3S/14W-15D1
SECTION G-G'
3S/14W-15G1
OLDER DUNE SAND
MEAN
GAGE
AQUIFER
SILVERADO
SAN PEDRO FORMATION
LYNWOOD
AQUIFER (400 FT. GRAVEL)
AQUIFER
PICO FORMATION
GARDENA SY
CHARNOCK FAULT
BASE OF FRESH WATER
D
WEST
COAST
WEST
+400
+200
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
ELEVATION IN FEET — U. S. G. S. DATUM
REDONDO BEACH
COAST HIGHWAY U.S. 101 ALT.
ACTIVE DUNE SAND
SEPULVEDA BLVD.
4S/14W-6K1
EL SEGUNDO SAND HILLS
190 TH ST.
3S/14W-32J1
HAWTHORNE AVE.
3S/14W-33K3
3S/14W-33K2
3S/14W-34N3
3S/14W-34F2
3S/14W-34B2
174 TH. ST.
3S/14W-27K1
3S/14W-35M3
CRENSHAW BLVD.
3S/14W-26Q5
GARDENA COMMUNITY NO 1-6
WESTERN AVE.
OLDER DUNE SAND
MEAN SEA LEVEL
GARDENA
MERGED
PLEISTOCENE
AQUIFERS
LYNWOOD
SILVERADO
PICO FORMATION

2

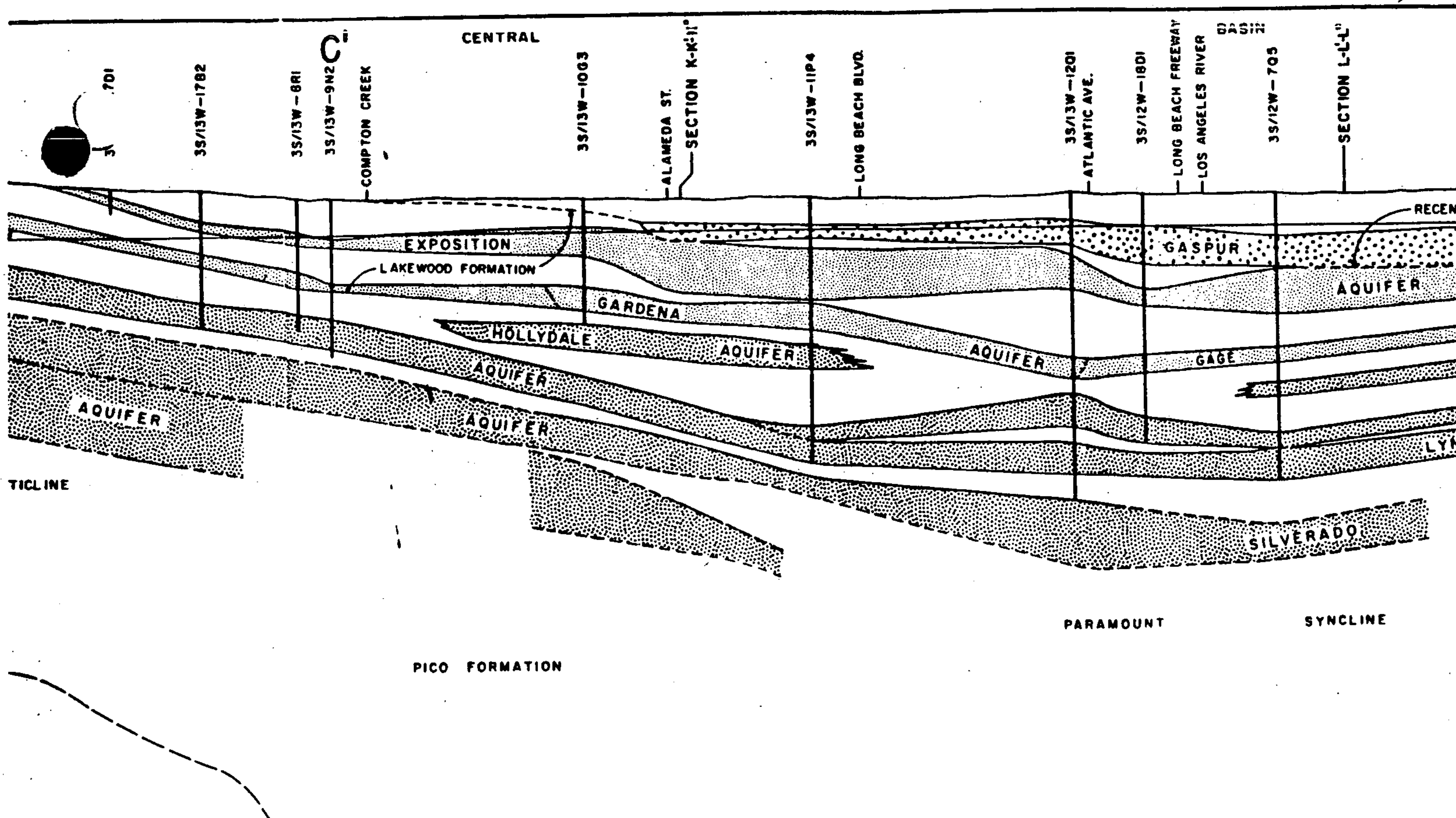


WEST
COAST
BASIN
3S/14W-17M1
ROSECRANS AVE.
3S/14W-17L1
3S/14W-17G1
3S/14W-17G2
3S/14W-9N4
HAWTHORNE BLVD.
3S/14W-9Q3
3S/14W-9Q1
3S/14W-15D1
SECTION G-G'
3S/14W-15G1
CRENSHAW BLVD.
3S/14W-14D1
3S/14W-14B1
3S/14W-14A1
WESTERN AVE.
3S/14W-12Q2
3S/14W-13B2
HARBOR FREEWAY
3S/13W-7P1
HAWTHORNE
SAND
MEAN SEA LEVEL
GAGE AQUIFER
("200 FT. SAND")
LYNWOOD AQUIFER ("400 FT. GRAVEL")
AQUIFER
LYNWOOD
SAN PEDRO FORMATION
SILVERADO
SUNNYSIDE
ROSECRANS ANTICL.
FORMATION
PICO FORMATION
GARDENA SYNCLINE
CHARNOCK FAULT
BASE OF FRESH WATER

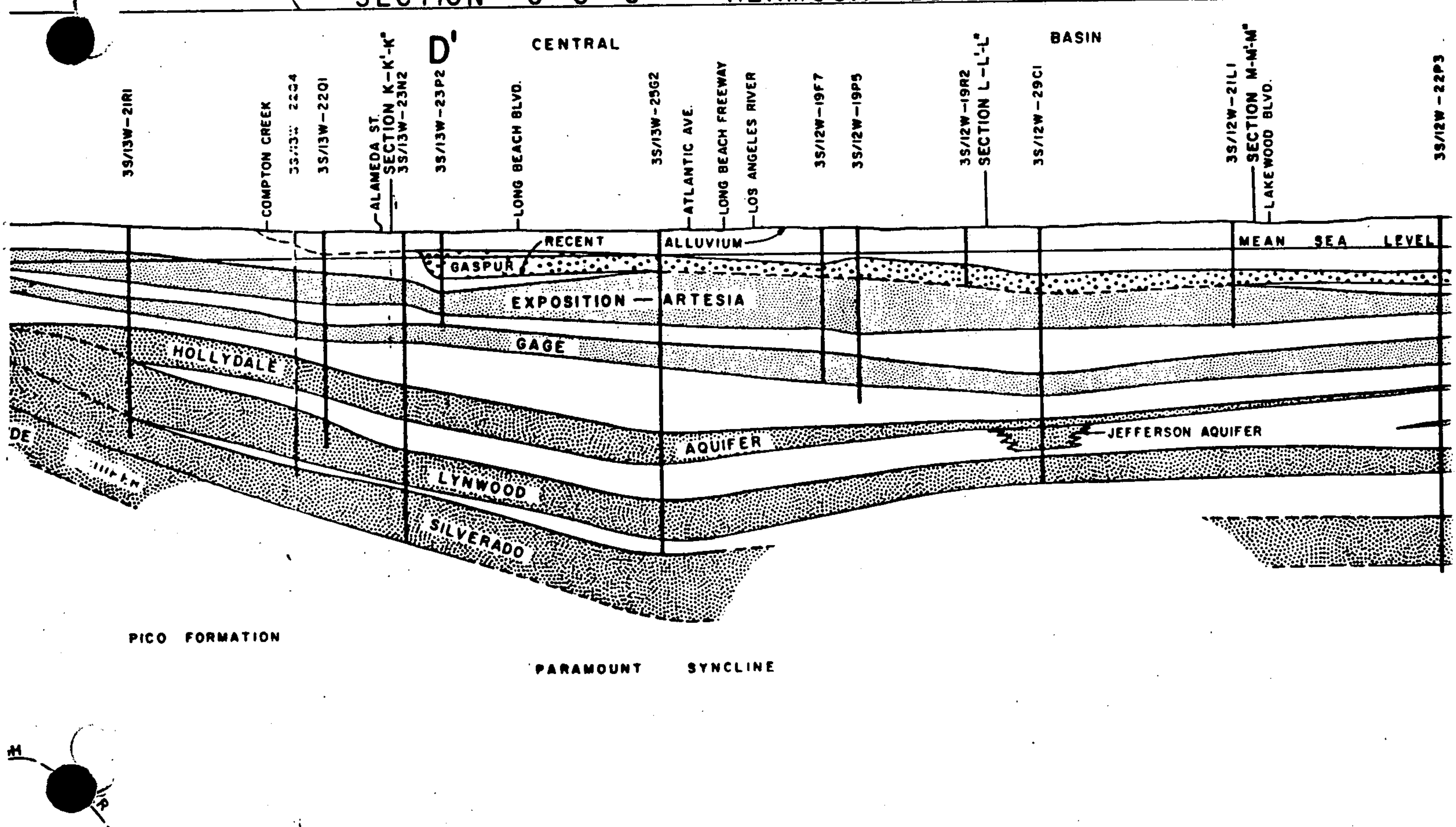


WEST
COAST
BASIN
190 TH ST.
3S/14W-32J1
HAWTHORNE AVE.
3S/14W-33K3
3S/14W-33K2
3S/14W-34N3
3S/14W-34F2
3S/14W-34B2
174 TH. ST.
3S/14W-27K1
3S/14W-35M3
CRENSHAW BLVD.
3S/14W-26Q5
GARDENA COMMUNITY NO. 1-6
WESTERN AVE.
3S/14W-25F3
SECTION G-G'
SECTION J-J'-J"
HARBOR FREEWAY
3S/13W-30A2
3S/13W-29C7
3S/13W-29A1
3S/13W-28D4
GARDENA
SEA LEVEL
LAKEWOOD FORMATION
GARDENA AQUIFER
MERGED PLEISTOCENE AQUIFERS
LYNWOOD AQUIFER ("400 FT. GRAVEL")
SUNNYSIDE
SILVERADO AQUIFER
SAN PEDRO FORMATION
PICO FORMATION
GARDENA SYNCLINE
AVALON — COMPTON FAULT
BASE OF FRESH

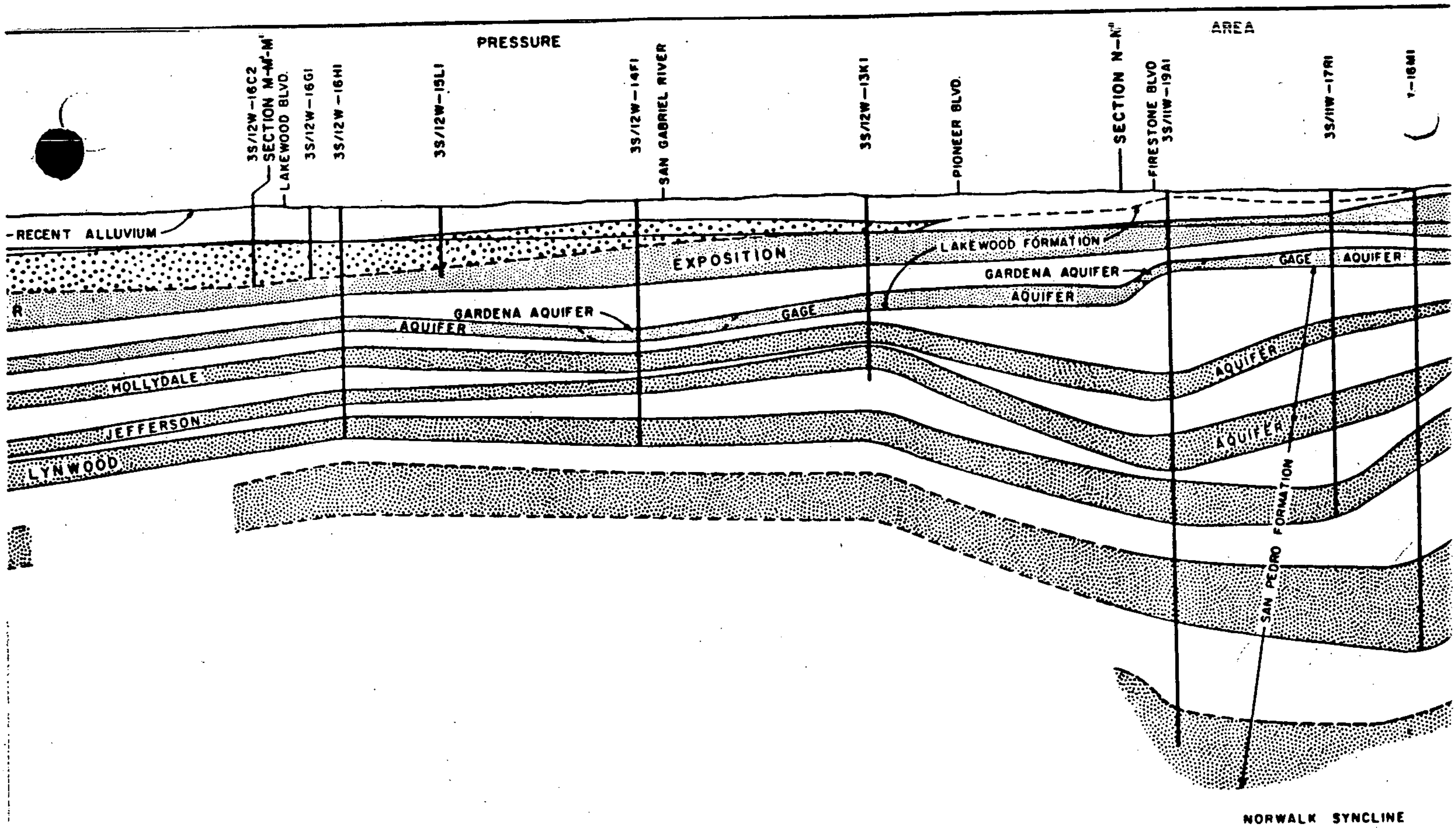
* 3



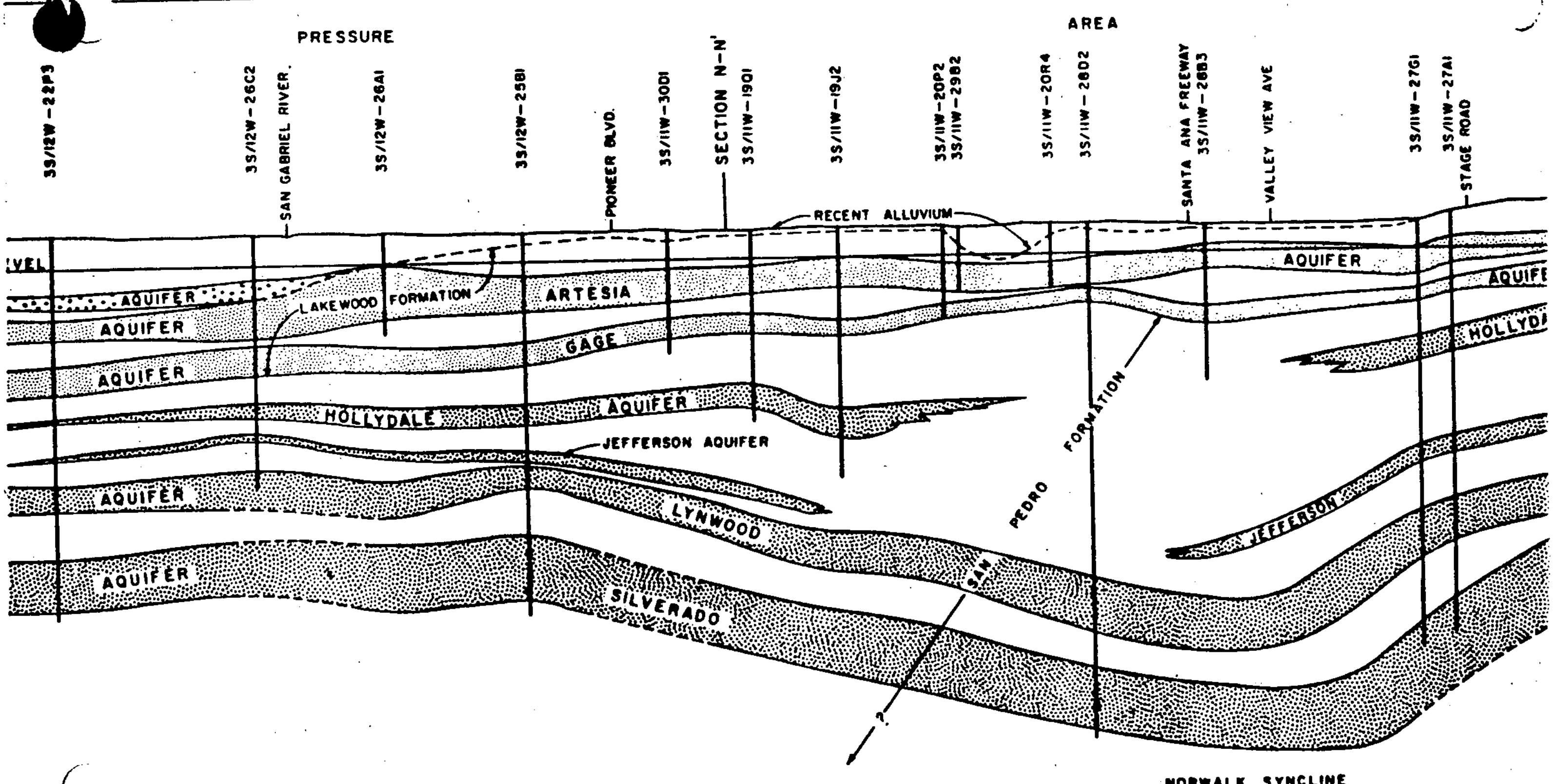
SECTION C-C'-C" — HERMOSA BEACH TO HAWTHORNE AND E



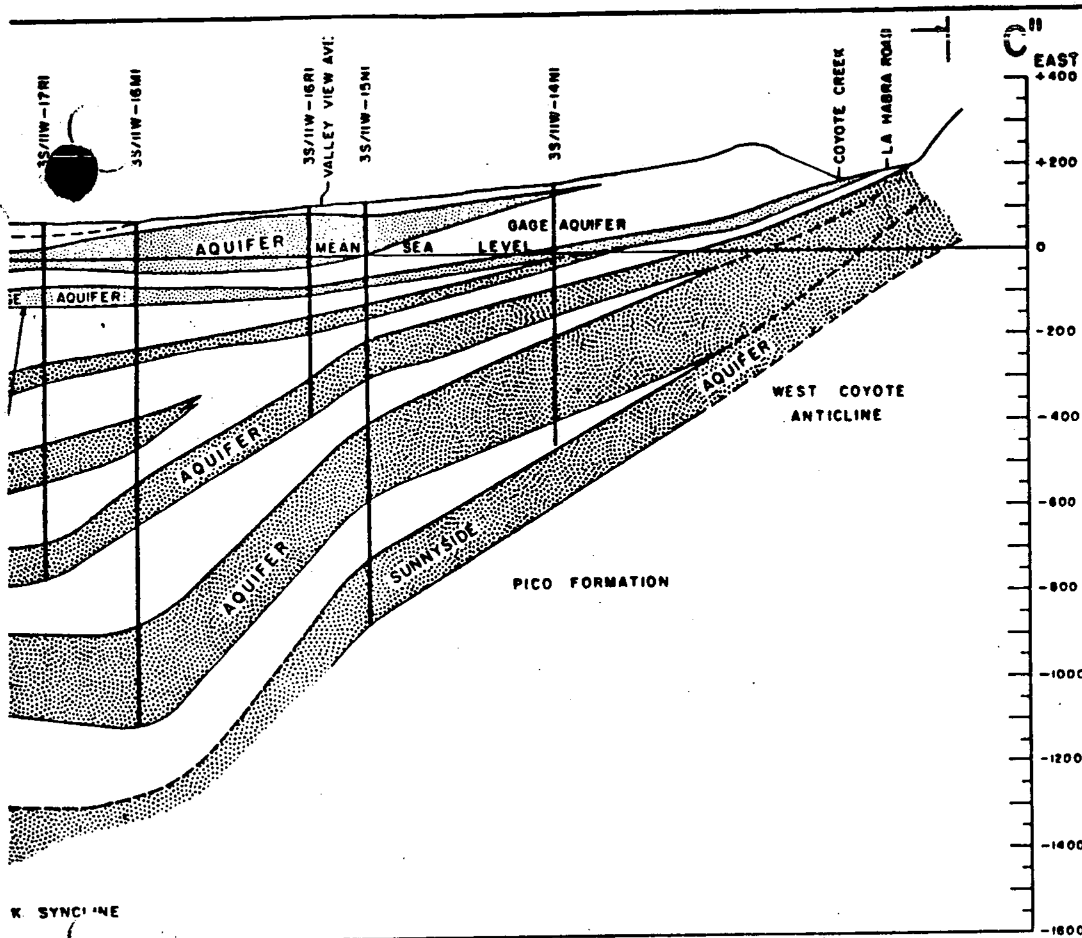
SECTION D-D'-D" — REDONDO BEACH TO GARDENA AND EASTERLY

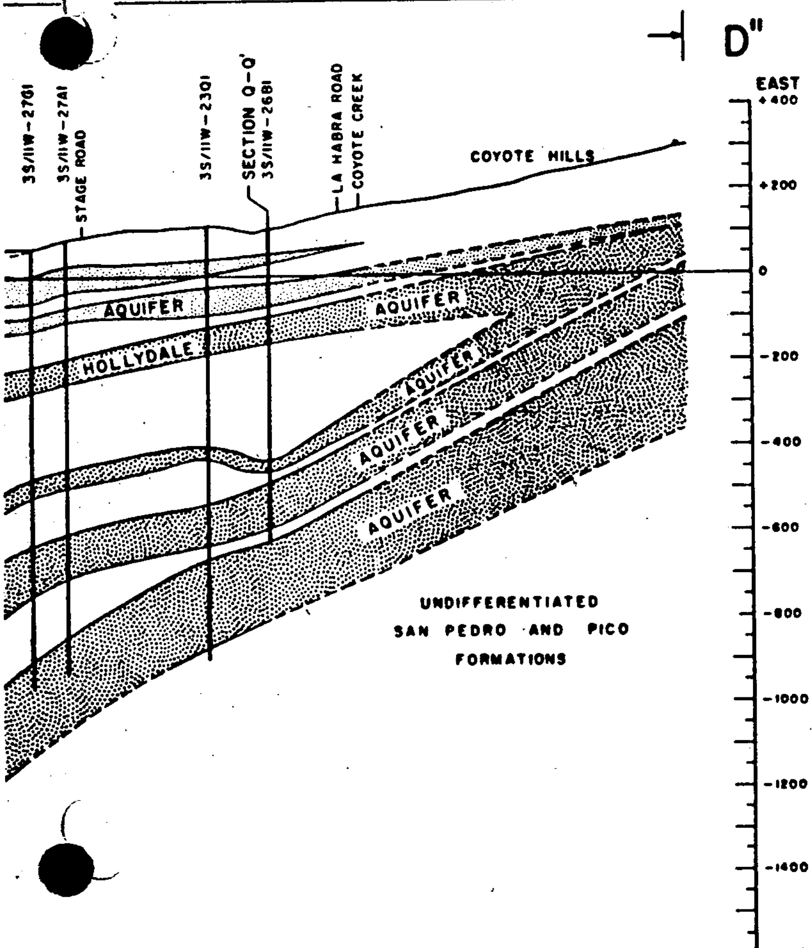


TERLY TO ORANGE COUNTY LINE SOUTH OF LA HABRA



LY INTO ORANGE COUNTY NORTH OF BUENA PARK





LEGEND

AQUICLUDES AND DEEPER UNDIFFERENTIATED FORMATIONS

AQUIFERS IN RECENT ALLUVIUM (INCLUDES THE GASPUR AND BALLONA AQUIFERS)

AQUIFERS IN LAKEWOOD FORMATION (INCLUDES THE ARTESIA, EXPOSITION, GAGE, AND GARDENA AQUIFERS)

AQUIFERS IN SAN PEDRO FORMATION (INCLUDES THE HOLLYDALE, JEFFERSON, LYNWOOD, SILVERADO, AND SUNNYSIDE AQUIFERS)

WATER WELLS

OIL WELLS

FAULTS

NOTE: LOCATIONS OF GEOLOGIC SECTIONS ARE SHOWN ON PLATE 3A AND 3B

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN CALIFORNIA DISTRICT

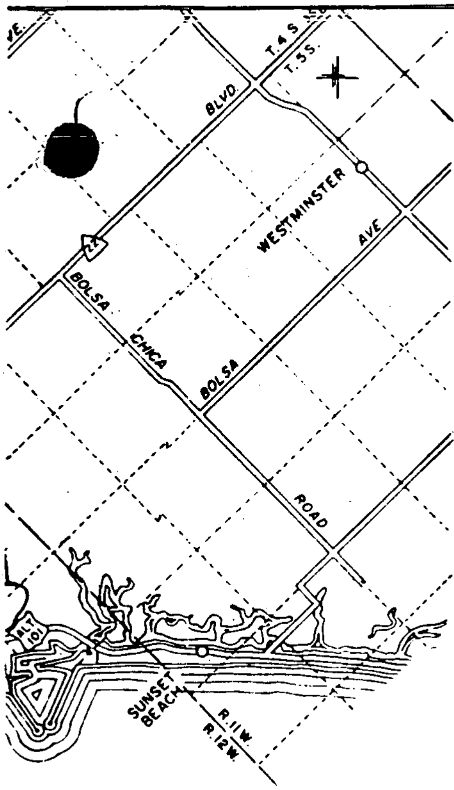
GROUND WATER GEOLOGY OF THE COASTAL PLAIN OF LOS ANGELES COUNTY

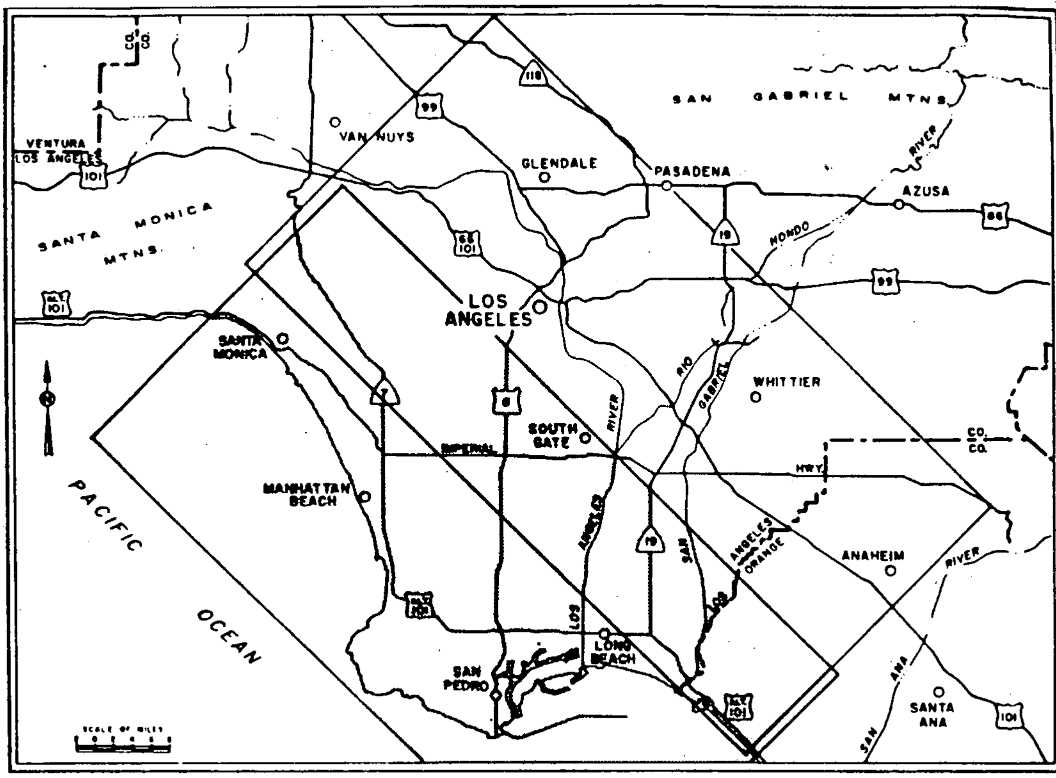
IDEALIZED GEOLOGIC SECTIONS C-C'-C" AND D-D'-D"

HORIZONTAL SCALE OF FEET
2000 0 2000 4000 6000

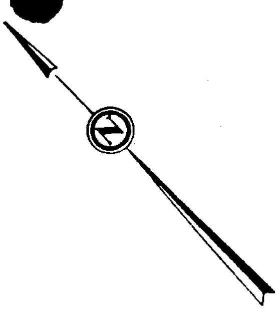
1961

Bellflower 1





LOCATION MAP



LEGEND

SURFACE FEATURES

Qal	RECENT ALLUVIUM
Qpu	UPPER PLEISTOCENE DEPOSITS
	LOWER PLEISTOCENE DEPOSITS
	NONWATER-BEARING ROCKS

SUBSURFACE FEATURES

BOUNDARY OF BELLFLOWER AQUICLUDE (DASHED WHERE LOCATION IS APPROXIMATE)

-60- LINES OF EQUAL ELEVATION ON THE BASE OF THE BELLFLOWER AQUICLUDE (DASHED WHERE CONTROL IS POOR)

FAULT (DASHED WHERE APPROXIMATELY LOCATED)

KNOWN AREAS WHERE THE BELLFLOWER AQUICLUDE IS ABSENT AND THE AQUIFERS PRESENT ARE IN HYDRAULIC CONTINUITY WITH THE SURFACE

BOUNDARY OF THE GASPUR AQUIFER

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN CALIFORNIA DISTRICT

GROUND WATER GEOLOGY OF THE COASTAL PLAIN OF LOS ANGELES COUNTY

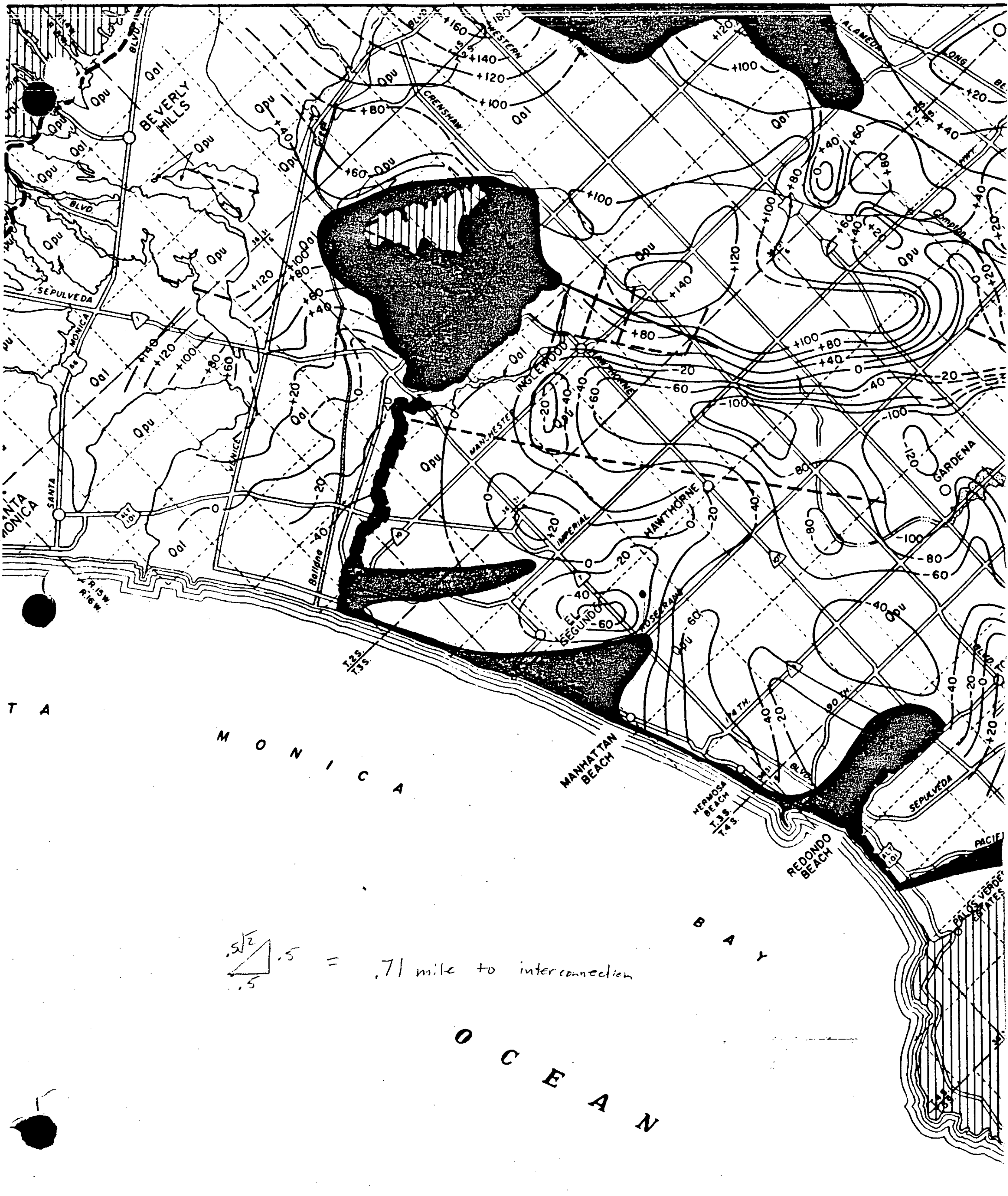
LINES OF EQUAL ELEVATION ON THE BASE OF THE BELLFLOWER AQUICLUDE

SCALE OF MILES

1 0 1 2 3

1961

Enclosure 3


BEVERLY HILLS
SANTA MONICA
SEPULVEDA
INGLEWOOD
HAWTHORNE
GARDENA
EL SEGUNDO
MANHATTAN BEACH
HERMOSA BEACH
REDONDO BEACH
PALOS VERDES ESTATES
WESTERN
CRENSHAW
MANCHESTER
IMPERIAL
ROSECRANS
ALAMEDA
LONG BEACH
SEPULVEDA
PACIFIC
Qal
Qpu
T.2S.
T.3S.
T.4S.
R.15W.
R.16W.
SANTA MONICA BAY
OCEAN
$\frac{.5\sqrt{2}}{}$ .5 .5 = .71 mile to interconnection

REFERENCE # 4

ENSR

ENSR CONSULTING & ENGINEERING

SUBSURFACE EXPLORATION

LITHOLOGIC LOG OF EB-1

Client : H. Kramer for SCE
Project Name : H. Kramer
Project Location : El Segundo, CA
Job Number : 0212-001 Boring No : EB-1
Logged By : B. Leever
Approved By : CK Keller, RG
Drilled By : A&R Drilling

DRILLING AND SAMPLING INFORMATION
Date Started : 7/27/90 Date Completed : 7/27/90
Method : HSA Total Depth : 30.5 feet

WELL COMPLETION INFORMATION
Screen Dia : . Length : .
Slot Size : . Type : .
Casing Dia : . Length : .

DEPTH IN FEET	DESCRIPTION SURFACE ELEVATION : 90 feet, U.S.G.S Venice, CA	SAMPLE NO.	SAMPLE TYPE	RECOVERY (FEET)	BLOW COUNT	* PID		GRAPHIC LOG	WELL COMPLETION
	SLAG FILL – consistency of silty sand (sm) gray to black with orange mottling, moist, unconsolidated, fine to coarse grained sand sized particles with abundant slag material	1	SS	1.5	20	0			
5		5	SS	0.5	11	0			
	SILTY CLAY (CL) light tan, moist, stiff, cohesive								
10		10	SS	1.5	14	0			
15	SILTY SAND (SM) tan to orange, slightly moist, unconsolidated, very fine to medium grain sand	15	SS	1.5	25	0			
20		20	SS	1.5	23	0			
25									
	continued SILTY SAND (SM)								
30		30	SS	1.5	50+	0			
	Bottom of boring at 30.5 feet. No free groundwater encountered. Boring backfilled with bentonite to ground surface.								
35									
40									
45									
50									
55	* PID: PHOTO-IONIZATION DETECTOR VALUE IN PPM RELATIVE TO ISO-BUTYLENE								

SAMPLER TYPE
SS – DRIVEN SPLIT SPOON
ST – PRESSED SHELBY TUBE
RC – ROCK CORE
CT – CONTINUOUS TUBE

BORING METHOD
HSA – HOLLOW STEM AUGER
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASI
MD – MUD DRILLING

ENSR

ENSR CONSULTING & ENGINEERING

SUBSURFACE EXPLORATION

LITHOLOGIC LOG OF EB-2

Client : H. Kramer for SCE
Project Name : H. Kramer
Project Location : El Segundo, CA
Job Number : 0212-001 Boring No : EB-2
Logged By : B. Leever
Approved By : CR Keller, RG
Drilled By : A&R Drilling

DRILLING AND SAMPLING INFORMATION
Date Started : 7/27/90 Date Completed : 7/27/9
Method : HSA Total Depth : 30.5 feet

WELL COMPLETION INFORMATION
Screen Dia : . Length : .
Slot Size : . Type : .
Casing Dia : . Length : .

DEPTH IN FEET	DESCRIPTION	SAMPLE NO.	SAMPLE TYPE	RECOVERY (FEET)	BLOW COUNT	PID *		GRAPHIC LOG	WELL COMPLETION
	SURFACE ELEVATION : 90 feet, U.S.G.S Venice, CA								
0	SLAG FILL – consistency of silty sand (sm) gray to black, dry, abundant slag material present to 8 feet	1	SS	1.5	4	0			
5		5	SS	1.0	12	0			
8	SILTY CLAY (CL) tan, moist								
10	SILTY SAND (SM) tan to orange, moist, unconsolidated, very fine to medium grained sand	10	SS	1.5	7	0			
15		15	SS	1.5	9	0			
20	SAND (SP) orange, slightly moist, medium grained sand	20	SS	1.5	19	0			
25									
30		30	SS	1.5	NA	0			
30.5	Bottom of boring at 30.5 feet. No free groundwater encountered. Boring backfilled with bentonite to ground surface.								
35									
40									
45									
50									
55	* PID: PHOTO-IONIZATION DETECTOR VALUE IN PPM RELATIVE TO ISO-BUTYLENE								

SAMPLER TYPE
SS – DRIVEN SPLIT SPOON
ST – PRESSED SHELBY TUBE
RC – ROCK CORE
CT – CONTINUOUS TUBE

BORING METHOD
HSA – HOLLOW STEM AUGER
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASING
MD – MUD DRILLING

ENSR

ENSR CONSULTING & ENGINEERING

Sheet 1

SUBSURFACE EXPLORATION

LITHOLOGIC LOG OF EB-3

Client : H. Kramer for SCE
Project Name : H. Kramer
Project Location : El Segundo, CA
Job Number : 0212-001 Boring No : EB-3
Logged By : B. Leever
Approved By : C.R. Keller, RG
Drilled By : A&R Drilling

DRILLING AND SAMPLING INFORMATION
Date Started : 7/27/90 Date Completed : 7/27/
Method : HSA Total Depth : 15.5 feet

WELL COMPLETION INFORMATION
Screen Dia : . Length : .
Slot Size : . Type : .
Casing Dia : . Length : .

SURFACE ELEVATION : 90 feet, U.S.G.S Venice, CA

DEPTH IN FEET	DESCRIPTION	SAMPLE NO.	SAMPLE TYPE	RECOVERY (FEET)	BLOW COUNT	PID *	GRAPHIC LOG	WELL COMPLETION
0	FILL – consistency of silty sand (sm) light brown, dry, medium dense, very fine to medium grained sand, no odor	1	SS	1.5	12	0		
5	continued SILTY SAND (SM) becomes dark gray and saturated in a zone of perched water to 9.5 feet	5	SS	0.5	5	0		
9.5	SILTY CLAY (CL) tan, moist, stiff	10	SS	1.5	14	0		
14	SAND (SP) tan to orange, moist, unconsolidated, very fine to medium grained sand	15	SS	1.5	14	0		
15.5	Bottom of boring at 15.5 feet. Perched groundwater encountered at 5 feet. Boring backfilled with bentonite to ground surface.							

* PID: PHOTO-IONIZATION DETECTOR VALUE IN PPM RELATIVE TO ISO-BUTYLENE

SAMPLER TYPE
SS – DRIVEN SPLIT SPOON
ST – PRESSED SHELBY TUBE
RC – ROCK CORE
CT – CONTINUOUS TUBE

BORING METHOD
HSA – HOLLOW STEM AUGER
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASIN
MD – MUD DRILLING

ENSR

ENSR CONSULTING & ENGINEERING

Sheet 1

SUBSURFACE EXPLORATION

LITHOLOGIC LOG OF EB-4

Client : H. Kramer for SCE
Project Name : H. Kramer
Project Location : El Segundo, CA
Job Number : 0212-001 Boring No : EB-4
Logged By : B. Leever/C. Osterberg
Approved By : CR Keller RG
Drilled By : A&R Drilling

DRILLING AND SAMPLING INFORMATION
Date Started : 7/27/90 Date Completed : 7/27,
Method : HSA Total Depth : 15.5 feet

WELL COMPLETION INFORMATION
Screen Dia : . Length : .
Slot Size : . Type : .
Casing Dia : . Length : .

DEPTH IN FEET	DESCRIPTION SURFACE ELEVATION : 90 feet, U.S.G.S Venice, CA	SAMPLE NO.	SAMPLE TYPE	RECOVERY (FEET)	BLOW COUNT	PID *		GRAPHIC LOG	WELL COMPLETION
0	FILL – consistency of silty sand (sm)	1	SS	0.5	NA	0			
2									
4									
5	SILTY CLAY (CL) brown to black, moist, soft, strong odor and staining	5	SS	0.5	4	0			
6									
8									
10		10	SS	1.5	12	6			
12									
13	SILTY SAND (SM) light brown, to brown, moist, fine to medium grained sand								
14									
15		15	SS	1.5	22	2			
16	Bottom of boring at 15.5 feet. No free groundwater encountered. Boring backfilled with betonite to ground surface.								
18									
20									
22									

* PID: PHOTO-IONIZATION DETECTOR VALUE IN PPM RELATIVE TO ISO-BUTYLENE

SAMPLER TYPE
SS – DRIVEN SPLIT SPOON
ST – PRESSED SHELBY TUBE
RC – ROCK CORE
CT – CONTINUOUS TUBE

BORING METHOD
HSA – HOLLOW STEM AUGER
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CAS[ING]
MD – MUD DRILLIN[G]

ENSR CONSULTING & ENGINEERING

SUBSURFACE EXPLORATION — LITHOLOGIC LOG OF EB-5

Client : H. Kramer for SCE
Project Name : H. Kramer
Project Location : El Segundo, CA
Job Number : 0212-001 Boring No : EB-5
Logged By : B. Leeyer\C. Osterberg
Approved By : C R Keller RG
Drilled By : A&R Drilling

DRILLING AND SAMPLING INFORMATION
Date Started : 7/27/90 Date Completed : 7/27/90
Method : HSA Total Depth : 15.5 feet

WELL COMPLETION INFORMATION
Screen Dia : . Length : .
Slot Size : . Type : .
Casing Dia : . Length : .

DEPTH IN FEET	DESCRIPTION SURFACE ELEVATION : 90 feet, U.S.G.S Venice, CA	SAMPLE NO.	SAMPLE TYPE	RECOVERY (FEET)	BLOW COUNT	PID *		GRAPHIC LOG	WELL COMPLETION	WATER
0	FILL – consistency of silty sand (sm) orange, moist, fine to medium grain sand size	1	HA	0.5	NA	0				
4	continued silty sand FILL material – becomes brown, moist, with increased silt content	5	HA	0.5	NA	0				
6	SANDY SILT (ML) dark brown, moist, fine to very fine grained sand									
8	continued SANDY SILT (ML) becomes very moist									
9	SILTY SAND (SM) light brown to brown, moist, fine to medium grained sand	10	HA	0.5	NA	0				
14		15	SS	1.5	27	0				
16	Bottom of boring at 15.5 feet. No free groundwater encountered. Boring backfilled with bentonite to ground surface.									
22	* PID: PHOTO-IONIZATION DETECTOR VALUE IN PPM RELATIVE TO ISO-BUTYLENE									

SAMPLER TYPE
SS – DRIVEN SPLIT SPOON
ST – PRESSED SHELBY TUBE
RC – ROCK CORE
CT – CONTINUOUS TUBE

BORING METHOD
HSA – HOLLOW STEM AUGER
CFA – CONTINUOUS FLIGHT AUGERS
DC – DRIVING CASIN[G]
MD – MUD DRILLING

REFERENCE # 5

MEMO TO FILE/CONTACT REPORT

PERSON CONTACTED: Peter Imaa

DATE: 4-29-91

REPRESENTING: Los Angeles County Flood Control District

TIME: 3:20

ADDRESS: 900 S. Freemont
Alhambra

PERSON TAKING OR MAKING CALL: David Stuck

PHONE NO: (818) 458-6123

SUBJECT: Rainfall Data for the City of El Segundo

MESSAGE: The 1year 24 hour rainfall is 2.4 inches

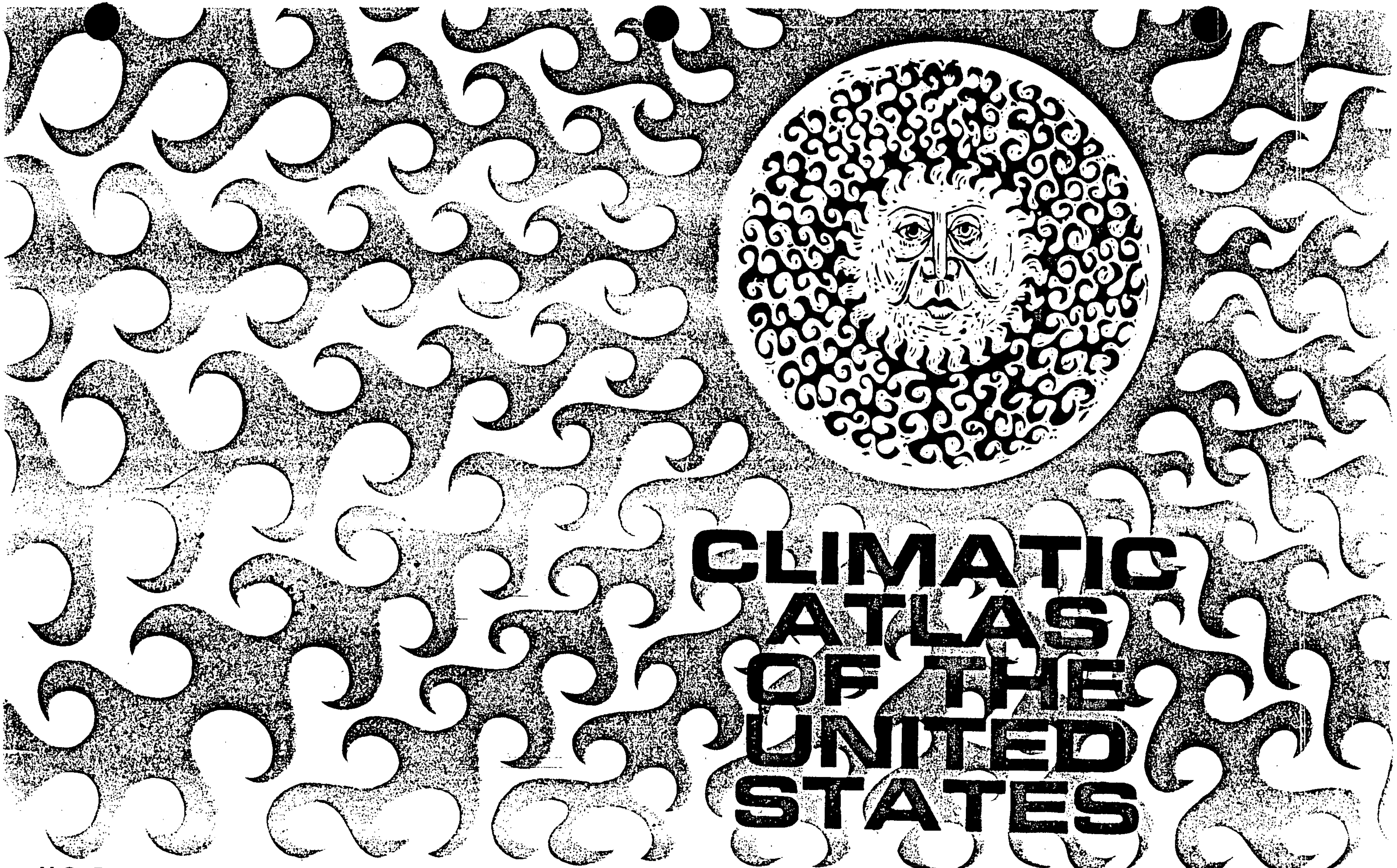
The annual rainfall is 12.05 inches.

The percentage of the annual rainfall for the given month is:

November	9.9 %
December	17.5%
January	19.5%
February	20.5%
March	16.5%
April	8.1%
Total	92 %

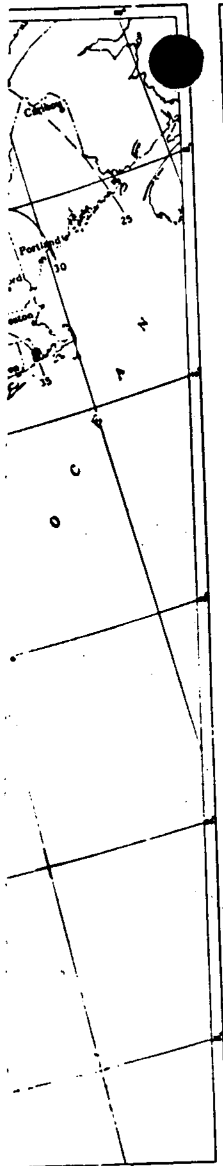
The seasonal Rainfall is .92 X 12.05 = 11.09 inches

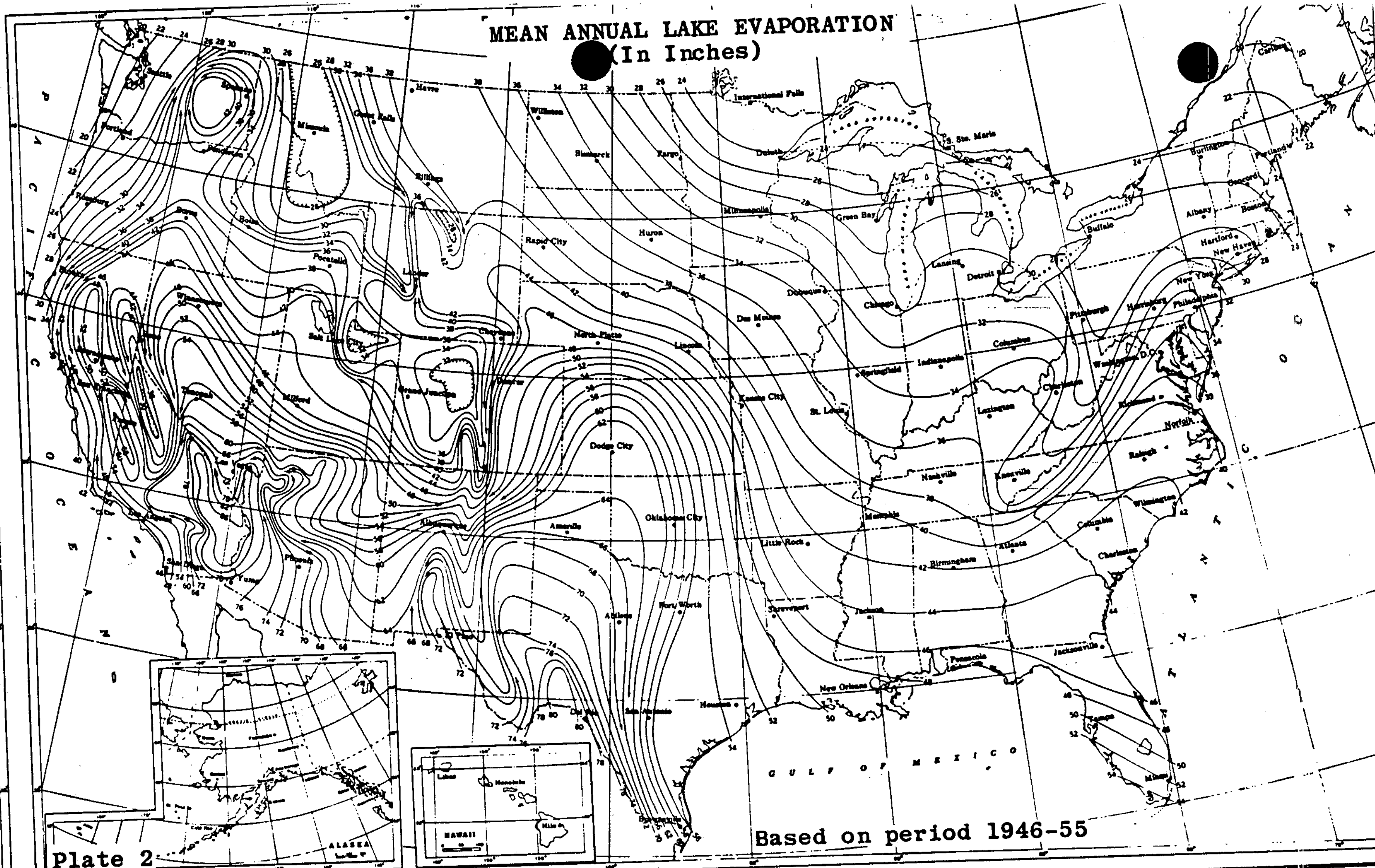
REFERENCE # 6

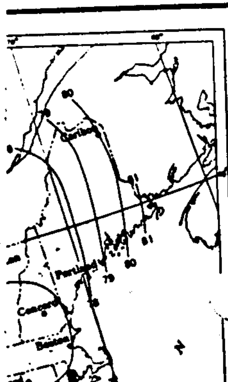


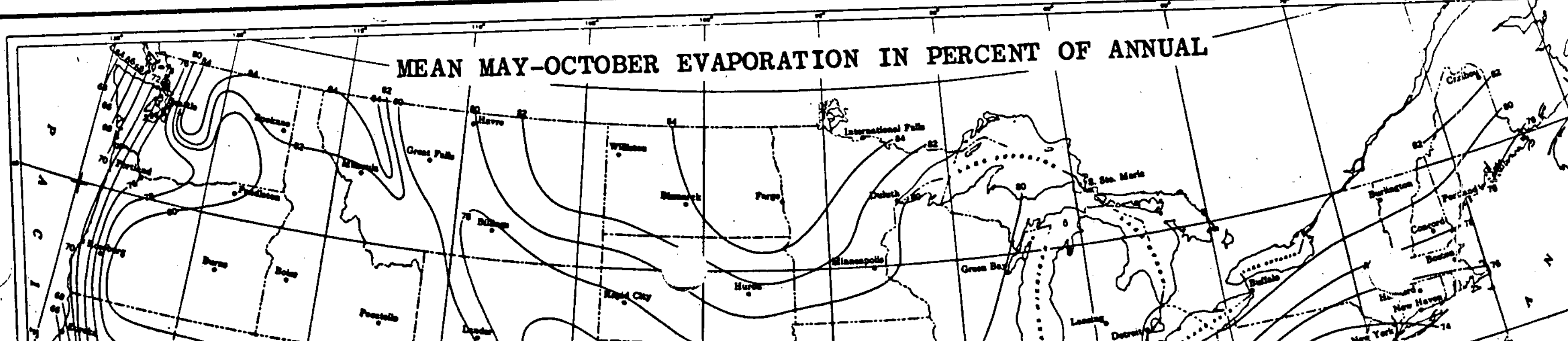
CLIMATIC ATLAS OF THE UNITED STATES

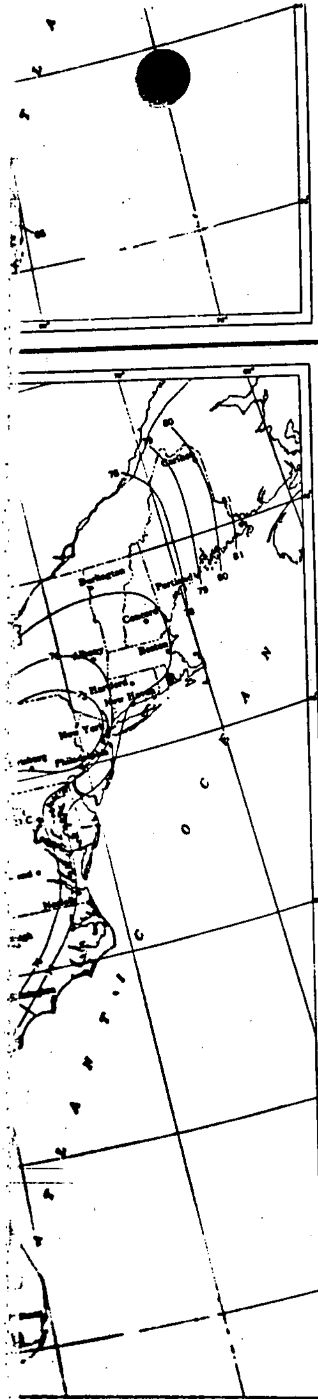
U.S. DEPARTMENT OF COMMERCE • Environmental Science Services Administration • Environmental Data Service




MEAN ANNUAL LAKE EVAPORATION
(In Inches)
GULF OF MEXICO
ALASKA
HAWAII
Plate 2
Based on period 1946-55




MEAN MAY-OCTOBER EVAPORATION IN PERCENT OF ANNUAL



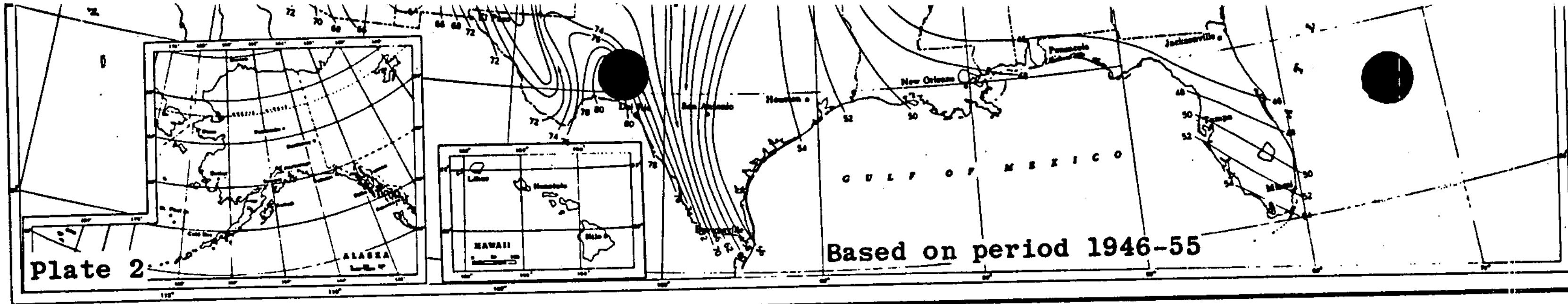
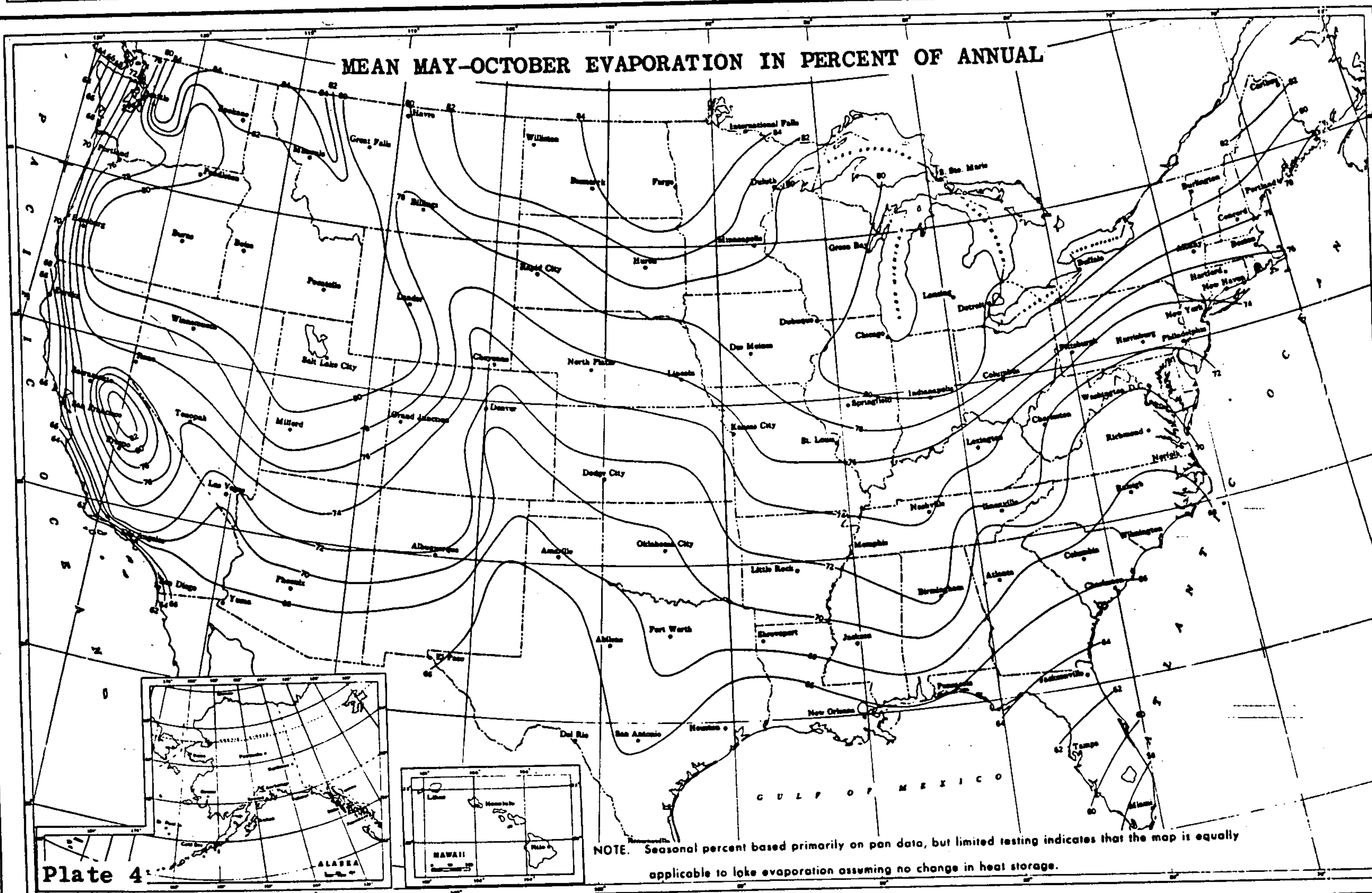


Plate 2

Based on period 1946-55



MEAN MAY-OCTOBER EVAPORATION IN PERCENT OF ANNUAL

NOTE. Seasonal percent based primarily on pan data, but limited testing indicates that the map is equally applicable to lake evaporation assuming no change in heat storage.

Plate 4

Mean Seasonal Lake Evaporation

mean annual lake evaporation

46 inches

mean May to October evaporation in percent of annual

62%

mean November to April evaporation in percent of annual

$100 - 62 = 38\%$

mean November to April evaporation

46 inches $\times .38 =$ 17.48 inches

REFERENCE # 7

HAZARD RANKING SYSTEM

GUIDANCE MANUAL

FOR

FEDERAL FISCAL YEAR 1989

(OCTOBER 1, 1988 - SEPTEMBER 30, 1989)

AUGUST 1988

State of California
Department of Health Services
Toxic Substances Control Division
Site Mitigation Section
Site Evaluation Program

TABLE 2

PERMEABILITY OF GEOLOGIC MATERIALS*

Type of Material	Approximate Range of Hydraulic Conductivity	Assigned Value
Clay, compact till, shale; unfractured metamorphic and igneous rocks	$<10^{-7}$ cm/sec	0
Silt, loess, silty clays, silty loams, clay loams; less permeable limestone, dolomites, and sandstone; moderately permeable till	$10^{-5} - 10^{-7}$ cm/sec	1
Fine sand and silty sand; sandy loams; loamy sands; moderately permeable limestone, dolomites, and sandstone (no karst); moderately fractured igneous and metamorphic rocks, some coarse till	$10^{-3} - 10^{-5}$ cm/sec	2
Gravel, sand; highly fractured igneous and metamorphic rocks; permeable basalt and lavas; karst limestone and dolomite	$>10^{-3}$ cm/sec	3

*Derived from:

Davis, S. N., Porosity and Permeability of Natural Materials in Flow-Through Porous Media, R.J.M. DeWest ed., Academic Press, New York, 1969

Freeze, R.A. and J.A. Cherry, Groundwater, Prentice-Hall, Inc., New York, 1979

REFERENCE # 8

LAW OFFICES OF
ALSCHULER, GROSSMAN & PINES
A PARTNERSHIP INCLUDING PROFESSIONAL CORPORATIONS
TWELFTH FLOOR, 1880 CENTURY PARK EAST
LOS ANGELES, CALIFORNIA 90067-1694
TELEPHONE (213) 277-1226

LEON S. ALSCHULER
1910-1987
OF COUNSEL
IRVING KELLOGG*

CABLE: SAGELAW
TELEX: 183850
TELECOPIER:
(213) 552-6077

November 27, 1990

OUR FILE NO.
3664-5905
3664-5143

WRITER'S DIRECT DIAL NUMBER
551-9125

VIA MESSENGER DELIVERY

Mr. William Jones
Investigation Section
Hazardous Waste Control Program
Department of Health Services
2615 South Grand Ave., Suite 607
Los Angeles, CA 90007

Ms. Shahin Nourishad
Los Angeles County
Department of Health Services
2615 South Grand Ave., Suite 607
Los Angeles, CA 90012

Mr. James Ross
California Regional Water
Quality Control Board
101 Centre Plaza Drive
Monterey Park, CA 91754

Mr. Hamid Saebfar
California Department of Health Services
1405 No. San Fernando Blvd., Suite 300
Burbank, CA 91504

Re: H. Kramer & Co. property located at
1 Chapman Way, El Segundo, California

Gentlemen and Ms. Nourishad:

This firm represents H. Kramer & Co. ("Kramer"), the owner of the property located at 1 Chapman Way, El Segundo, California (the "Property"). This property was formerly the subject of a Section 106 removal order issued by the United States Environmental Protection Agency ("EPA") on June 7, 1988 (the "Order"). The Order was initially denominated by EPA as No. 88-17 and subsequently renumbered as 88-19.

It is our understanding that representatives of EPA Region IX have been in touch with each of your respective agencies concerning the Property. As you may also be aware, Kramer was recently formally advised by EPA that the Order has been amended in a fashion which results in Kramer being discharged from any further obligations under it. A copy of the Order and the EPA's recent letter dated November 7, 1990 is enclosed for your information.

Notwithstanding the fact that Kramer is now discharged from EPA's Order, we, on behalf of Kramer, and Kramer's environmental consultant, ENSR Consulting & Engineering ("ENSR"), would like to meet with all of you to discuss further activities at the Property. The purpose of this letter is to suggest that such a meeting be held on December 11, 14, the morning of the 17th or anytime on December 18, 19, 20 or 21 at your mutual convenience. Ms. Nourishad has already been kind enough to volunteer the use of the office of Los Angeles County Department of Health Services at 2615 South Grand Avenue, Sixth Floor, Los Angeles, California.

In order to make our meeting as productive as possible, we also wanted to take this opportunity to provide you with a brief history of recent events at the Property, as well as a description of present circumstances and anticipated future events which make it a matter of substantial importance to Kramer and certain other parties identified below that we all reach a common understanding as to how to proceed with respect to the Property.

<u>RECENT HISTORY</u>

Kramer acquired the Property in 1951 and operated it as a brass and bronze smelting facility. It ceased operations at the Property in mid-1985. In late 1985 or early 1986, Kramer filed a petition for reorganization pursuant to Chapter XI of the Bankruptcy Code. The bankruptcy proceeding was filed in the United States Bankruptcy Court for the Northern District of Illinois and remains pending. Kramer operates as a debtor-in-possession.

In early 1988, the Property came to the attention of certain local agencies, including the Fire Department of the City of El Segundo. The primary immediate concern arose from the presence of dust and ash on the portion of the Property near the furnaces and repeated reported instances of people breaking into the Property (by cutting through the fences at one or more locations) in order to play nocturnal simulated "war games" with paint pellet guns. Ultimately, EPA was notified and, at EPA's request, Kramer consented to cooperate in providing it access to the Property to ascertain the exact nature of the conditions thereon. EPA's inspection, which was headed by its On-Scene Coordinator Dan Shane, took place in mid-March 1988.

Based on a report prepared by its contractor, Ecology and Environment, EPA issued the Order. A copy of the Ecology and Environment report is enclosed for your information.

Complying with the Order posed enormous difficulties for Kramer. Although its current operations (in other words, its plant in Chicago) generally have not run at a loss over the past couple of years, they do not throw off, and have not thrown off, sufficient income to finance any significant activities with respect to the Property. Nonetheless, Kramer succeeded in raising funds sufficient to finance the development and implementation of an EPA-approved work plan for the clean-up of surficial debris. All hazardous materials (principally, metal-bearing dust and ash) collected during that clean-up are presently appropriately secured and stored at the Property, with EPA's consent. In addition, Kramer was able to develop and implement an EPA-approved site investigation plan. Copies of the Report and Supplemental Report prepared by ENSR setting forth the results of that investigation have been provided to each of your respective agencies. Should any of you require additional copies of those Reports, please contact this office, and we will arrange for their delivery to you.

While the Reports of the site investigation speak for themselves, it is fair to say that the sampling and testing conducted in connection with the site investigation disclosed the presence of certain metals in the soil below and around the slag pile at the Property as well as certain contaminants in the groundwater. Prominent in both categories is arsenic, which was deposited in a pond located where the slag pile is now located by the firm which sold the Property to Kramer. At the time Kramer acquired the Property, it may not even have known of the existence of the sump, let alone the fact that arsenic was placed in it. We are informed that the other substances in the groundwater - hydrocarbons and solvents - could not have resulted from any operations in which Kramer engaged.

Following completion of the site investigation, we met with EPA to discuss what, if anything, should be required by way of a final remedy with respect to the Property. Although an agreement in principle was reached, it was not formally documented because, apparently, EPA decided that the conditions at the Property no longer justified the pendency of the Order and amended it as described above.

FUTURE ACTIVITIES

In order for Kramer to emerge from Chapter XI, it must arrange for a sale of the Property. In light of the regulatory attention the Property has attracted, it has been apparent for the last two years that it will be extremely difficult to arrange for such a sale unless the prospective purchaser has some reasonable assurance as to exactly what, if anything, your respective agencies expect with respect to the Property and the limits of those expectations. To the extent that any further action will be required to address any of the environmental conditions at the Property, Kramer must rely largely, if not entirely, on the proceeds from a sale of the Property to fund any such activities. Accordingly, one of the issues we hope to discuss with you is what further action, if any, your agencies anticipate requiring with respect to the Property in the foreseeable future, to the extent that you are presently able to define such action.

In addition, as you may know, a portion of the aerial light rail system being constructed by the Los Angeles County Transportation Commission ("LACTC") will be running over the small office building and the slag pile located on the Property. A contract has already been entered into with LACTC pursuant to which it will shortly be acquiring an easement interest in air rights appurtenant to a strip of the Property running over the office building and the slag pile, as well as in the surface area needed to construct two sets of pilings to support the aerial light rail as it traverses the Property.

In addition, in order to accommodate the air space requirements of the light rail system, Southern California Edison ("SCE") has agreed to relocate certain utilities it has previously constructed at the Property on easements that it has held for decades. More specifically, SCE will be relocating underground the portion of its low voltage distribution line which runs near and more or less over the gate into the Property, and it will be constructing a new tower to support the high voltage transmission lines traversing the Property at a greater height.

Both LACTC and SCE have expressed a desire to ensure that your agencies are fully aware of their respective activities and the precautions with which they will be undertaken. Kramer has agreed to provide LACTC all reasonable assistance in clarifying these matters with your agencies.

Accordingly, we would appreciate hearing from each of you at your earliest convenience which of the suggested dates would be convenient for an all-hands meeting concerning the Property. We cannot emphasize too strongly that, from Kramer's point of view, there is significant urgency associated with this situation. Its creditors have resumed periodic threats to seek to liquidate Kramer, and the unfortunate lapse in time between EPA's receipt of the results of the site investigation last Spring and the issuance of its November letter amending the Order so as to discharge Kramer has only exacerbated their discontent. If the creditors succeed in convincing the Court to accept a plan of liquidation, it is probable that no funds will be available to finance any further efforts with regard to environmental conditions at the Property. If, however, we can demonstrate to the creditors and the Bankruptcy Court that this situation is finally approaching some resolution, it is likely that Kramer will retain the latitude it needs to move forward.

I would appreciate it if each of you would let me know as soon as possible when a meeting would be convenient for you. If primary responsibility for this matter has been assigned elsewhere within any of your agencies, please let me know immediately whom I should contact. We anticipate that Kramer would be represented at such a meeting by me as well as Dan Bergman, of ENSR. LACTC would likely be represented by its counsel, O'Melveny & Myers, one or more members of its staff and possibly also its environmental consultant.

Of course, if any of you have any questions at all or require any additional information, please do not hesitate to contact me at once. Thank you in advance for your anticipated courtesy and cooperation.

Sincerely,

Linda Sutton

Linda Sutton

LS:pp
Enclosures
cc: William P. O'Brien (w/o enc.) - VIA TELECOPIER
Paula Jacobi, Esq. (w/o enc.) - " "
Dan Bergman (w/o enc.) - " "
Christopher Crain, Esq. (w/o enc.) - " "

REFERENCE # 9

State of California

Department of Health Services

Memorandum

To : Chuck McLaughlin, Region 1
Susan Solarz, Region 2
Megan Cambridge, Region 3

Date : October 20, 1988

Subject: Addendum to HRS Manual

Bob Crandall

From : Bob Crandall
HQ SEP

Attached are copies of the "EPA HRS Waste Characteristics Values" - Table I which were not included in the recently-distributed HRS Manual. Please provide your staff with these copies. These pages should be inserted between page 18 and 19 in Section IV of the manual.

Attachments

TABLE I

EPA Hazard Ranking System Waste Characteristics Values
(Toxicity/Persistence Matrix)

Chemical/Compound	Ground Water and Surface Water Pathway Values	Air Pathway Values
Acenapthene	9	3
Acetaldehyde	6	6
Acetic Acid	6	6
Acetone	6	6
2-Acetylaminoflourene	18	9
Aldrin	18	9
Ammonia	9	9
Aniline	12	9
Anthracene	15	9
Arsenic	18	9
Arsenic Acid	18	9
Arsenic Trioxide	18	9
Asbestos	15	9
Barium	18	9
Benzene	12	9
Benzidine	18	9
Benzoapyrene	18	9
Benzopyrene, NOS	18	9
Beryllium & Compounds NOS	18	9
Beryllium Dust, NOS	18	9
Bis (2-Chloroethyl) Ether	15	9
Bis (2-Ethylhexyl Phthalate	12	3
Bromodichloromethane	15	6
Bromoform	15	6
Bromomethane	15	9
Cadmium	18	9
Carbon Tetrachloride	18	9
Chlordane	18	9
Chlorobenzene	12	6
Chloroform	18	6
3-Chlorophenol	12	6
4-Chlorophenol	15	9
2-Chlorophenol	12	6
Chromium	18	9
Chromium, Hexavalent (Cr^{+6})	18	9

Table I (cont.)

Chemical/Compound	Ground Water and Surface Water Pathway Values	Air Pathway Values
Chromium, Trivalent (Cr^{+3})	15	6
Copper & Compounds, NOS	18	9
Creosote	15	6
Cresols	9	6
4-Cresol	12	9
Cupric chloride	18	9
Cyanides (soluble salts), NOS	12	9
Cyclohexane	12	6
DDE	18	9
DDT	18	9
Diaminotoluene	18	6
Dibromochloromethane	15	6
1, 2-Dibromo, 3-chloropropene	18	9
Di-N-Butyl-Phthalate	18	6
1, 4-Dichlorobenzene	15	6
Dichlorobenzene, NOS	18	6
1, 1-Dichloroethane	12	6
1, 2-Dichloroethane	12	9
1, 1-Dichloroethene	15	9
1, 2-cis-Dichloroethylene	12	3
1, 2-trans-Dichloroethylene	12	3
Dichloroethylene, NOS	12	3
2, 4-Dichlorophenol	18	6
2, 4-Dichlorophenoxyacetic Acid	18	9
Dicyclopentadiene	18	9
Dieldrin	18	9
2, 4-Dinitrotoluene	15	9
Dioxin	18	9
Endosulfan	18	9
Endrin	18	9
Ethylbenzene	9	6
Ethylene Dibromide	18	9
Ethylene Glycol	9	6
Ethyl Ether	15	3
Ethylmethacrylate	12	6

Table I (cont.)

Chemical/Compound	Ground Water and Surface Water Pathway Values	Air Pathway Values
Fluorine	18	9
Formaldehyde	9	9
Formic Acid	9	6
Heptachlor	18	9
Hexachlorobenzene	15	6
Hexachlorobutadiene	18	9
Hexachlorocyclohexane, NOS	18	9
Hexachlorocyclopentadiene	18	9
Hydrochloric Acid	9	6
Hydrogen Sulfide	18	9
Indene	12	6
Iron & Compounds, NOS	18	9
Isophorone	12	6
Isopropyl Ether	9	3
Kelthane	15	6
Kepone	18	9
Lead	18	9
Lindane	18	9
Magnesium & Compounds, NOS	15	6
Manganese & Compounds, NOS	18	9
Mercury	18	9
Mercury Chloride	18	9
Methoxychlor	15	6
4, 4-Methylene-Bis-(2-Chloroaniline)	18	9
Methylene Chloride	12	6
Methyl Ethyl Ketone	6	6
Methyl Isobutyl Ketone	12	6
4-Methyl-2-Nitroaniline	12	9
Methyl Parathion	9	9
2-Methylpyridine	12	6
Mirex	18	9

Table I (cont.)

Chemical/Compound	Ground Water and Surface Water Pathway Values	Air Pathway Values
Naphthalene	9	6
Nickel & Compounds, NOS	18	9
Nitric Acid	9	9
Nitroaniline, NOS	18	9
Nitrogen Compounds, NOS	12	0
Nitroguanidine	12	9
Nitrophenol, NOS	15	9
m-Nitrophenol	15	
o-Nitrophenol	12	
p-Nitrophenol	15	
Nitrosodiphenylamine	12	6
Parathion	9	9
Pentachlorophenol (PCP)	18	9
Pesticides, NOS	18	9
Phenanthrene	15	9
Phenol	12	9
Phosgene	9	9
Polybrominated Biphenyl (PBB), NOS	18	9
Polychlorinated Biphenyls (PCB), NOS	18	9
Potassium Chromate	18	9
Radium & Compounds, NOS	18	9
Radon & Compounds, NOS	15	9
RDX (Cyclonite)	15	
2, 4-D, Salts & Esters	18	9
Selenium	15	9
Sevin (Carbaryl)	18	9
Sodium Cyanide	12	9
Styrene	9	6
Sulfate	9	0
Sulfuric Acid	9	9
2, 4, 5-T	18	9
1, 1, 2, 2-Tetrachloroethane	18	9
Tetrachloroethane, NOS	18	9
1, 1, 2, 2-Tetrachloroethene	12	6

Table I (cont.)

Chemical/Compound	Ground Water and Surface Water Pathway Values	Air Pathway Values
Tetraethyl Lead	18	9
Tetrahydrofuran	15	6
Thorium & Compounds, NOS	18	9
Toluene	9	6
TNT	12	
Toxaphene	18	9
Tribromomethane	18	9
1, 2, 4-Trichlorobenzene	15	6
1, 3, 5-Trichlorobenzene	15	6
1, 1, 1-Trichloroethane	12	6
1, 1, 2-Trichloroethane	15	6
Trichloroethane, NOS	15	6
Trichloroethene	12	6
1, 1, 1-Trichloropropane	12	6
1, 1, 2-Trichloropropane	12	6
1, 2, 2-Trichloropropane	12	6
1, 2, 3-Trichloropropane	15	9
Uranium & Compounds, NOS	18	9
Varsol	12	6
Vinyl Chloride	15	9
Xylene	9	6
Zinc & Compounds, NOS	15	9
Zinc Cyanide	18	9

NOS -

REFERENCE # 10

ecology and environment, inc.
717 W. TEMPLE ST., LOS ANGELES, CA 90012, TEL. 213-481-3870
International Specialists in the Environment

May 16, 1988

U.S. Environmental Protection Agency
215 Fremont Street
San Francisco, CA 94105

Ref. No. 19-0588-004
TDD No. T098802-019
PA No. TCA1097-SAA

Attention: William E. Lewis, Deputy Project Officer

Subject: H. Kramer and Company, Site Assessment
El Segundo, California

On February 25, 1988, the Technical Assistance Team (TAT) was tasked to perform preliminary assessment (PA) activities at the H. Kramer and Company facility (HK&C) located in El Segundo, California (see Attachment A for a location map). Routine inspections by the El Segundo Fire Department (ESFD) had revealed that the lack of security at the site was creating a public hazard under the Uniform Fire Code, Article 80. Since ESFD correspondence with HK&C in regard to securing the site had proven fruitless, the Los Angeles County Department of Health Services (LADHS) was contacted about the hazardous conditions at the abandoned facility. A LADHS file search revealed that the HK&C facility had been investigated in 1983 for improper disposal practices. Analytical results indicated that the large slag pile located on-site contained elevated levels of leachable lead and copper. LADHS, in turn, requested assistance from the Environmental Protection Agency (EPA). A PA was subsequently scheduled to determine the need for EPA involvement. This interim report summarizes findings at the HK&C facility through May 7, 1988.

TAT contacted J. Richmond of ESFD to gather background information on the site. It was learned that HK&C is a Chicago based firm that has been in bankruptcy under Chapter 11 since 1985. The El Segundo plant operated as a secondary smelting operation from the early 1940's until the facility was abandoned in or around 1986. Mr. Richmond also stated that HK&C representatives had visited the site in February, 1988, but declined requests for site security commitments. Mr. Richmond expressed concerns about City of El Segundo liabilities resulting from any injuries sustained at the site. Chief Marsh, also with ESFD, and Mr. Richmond agreed to meet TAT at the site to provide a brief tour allowing TAT to view site conditions first hand.

On February 25, 1988, TAT members R. Randall and J. Tingle (Baton Rouge TAT) met Messrs. Marsh and Richmond on-site. HK&C, located at 1 Chapman Way, is situated on a site approximately seven acres in size (see Attachment B for a facility map). The site contains several buildings, smelting furnaces, scrap metal, and debris. The perimeter fencing was breached in several areas allowing easy access by children and vagrants, as evidenced by the presence of footprints, bicycle tracks, and graffiti. The area surrounding HK&C is mostly industrial, however, there is an office building one and one half blocks to the south and a residential area approximately three blocks further south. A lumber yard is in operation directly to the east and several employees utilize the HK&C parking lot during business hours.

During the site tour, the following items were noted as posing a potential risk to public health or welfare:

- Slag pile
- Laboratory chemicals
- Leaking drums
- Furnace ash/asbestos
- Cooling pond water/sludge

It was determined that the slag pile could pose an eminent and substantial threat based on LADHS reports of high leachable lead and copper levels. In the smelting process, a flux (such as limestone) is used to remove the worthless minerals that remain after concentration of the valuable metals. The flux forms a slag with silica and silicate impurities and is removed from the top of the molten metal. The hazards associated with the slag pile would result from off-site migration via surface run-off and dust inhalation. The volume of the slag pile was estimated at 100,000 cubic yards of material.

One of the buildings on-site was used as a laboratory when the facility was in operation. TAT observed several vessels containing various chemical solutions in two rooms of the laboratory. It was determined that a chemical exposure was very likely to occur if the public, especially children, continued to have access to the unchecked laboratory.

The site also contained approximately 75 drums of what appeared to be petroleum based materials. The drums were in various stages of decay, with some rusted and leaking. There were several other drums scattered throughout the site, but most appeared to be empty. Concerns surrounding the leaking drums included possible off-site migration and the potential that the drums contained PCB-laden waste oil.

TAT also observed dust collection units and two large silos used to contain particulate emissions from the smelting process. The dust is suspected of containing high levels of metals contamination and may easily migrate via air currents potentially causing an inhalation hazard to exposed persons. Portions of the smelting furnaces containing ash residue can also be found at the site. It is suspected that the refractory brick in these furnaces may contain asbestos, a known carcinogen.

TAT encountered two cement holding ponds, each approximately 4000 cubic feet in size. The ponds were reported to be used as quenches in the HK&C smelting process. One pond harbored a substantial amount of liquid, possibly rainwater, and both had a sludge build-up in the bottom.

Based on the observations made during the site tour, TAT determined that a potential threat of exposure to hazardous materials did exist and further site assessment (SA) activities would be required. TAT recommended that the site be secured until a SA schedule could be developed. TAT contacted On-Scene Coordinator (OSC) Shane to provide a full update of findings. Pursuant to the conversation, SA activities were scheduled for mid March, 1988.

On March 2, 1988, TAT contacted Mr. Richmond. He stated that ESFD had been contacted by P. Russell of Aero Industries (Aero) in Long Beach, California. Mr. Richmond was informed that Aero would be securing the site and would begin furnace demolition under contract to HK&C. TAT telephoned Mr. Russell in an effort to gain further knowledge of Aero's involvement at the site, but Mr. Russell would not release any information.

Prior to the scheduled SA investigation, HK&C representatives requested that their environmental consultant and lawyers be present during any on-site activities. OSC Shane agreed with their requests and arranged an on-site meeting with all of the involved parties on March 14, 1988.

On March 8, 1988, TAT learned from Mr. Richmond that the fence had been secured by Aero and that they were going to commence with demolition operations. Chief Marsh informed Aero personnel that they should not be doing on-site work without first confirming the absence of health hazards.

On March 14, 1988, TAT met on-site with OSC Shane and representatives of LADHS, ESFD, HK&C, and Aero (see Attachment C). The group proceeded to tour the site. TAT pointed out the areas that would be sampled during the site assessment effort. These areas included the laboratory chemicals, leaking drums, furnace ash, cooling pond sludge, and the slag pile. During the meeting, it was learned that Aero had made an agreement with HK&C to assume any necessary cleanup responsibilities in return for the salvageable materials and a reduced purchase price on the property. Specific details of the agreement were not available at that time. Discussion of individual party interests revealed that Aero wanted to begin removing the blast furnace, cooling towers, and other salvageables as soon as possible. ESFD stated that they did not want operations initiated that would create dusts that would migrate off-site. ESFD requested that Aero assemble a workplan and provide it to the City of El Segundo for approval before doing any more work at the site. B. Pines, HK&C's lawyer, stressed that a cooperative effort would benefit everyone involved since his client was in bankruptcy and Aero has agreed to assume cleanup responsibilities. OSC Shane stated that the EPA would assume the lead agency role and continue to coordinate efforts with LADHS and ESFD. In addition, no further site work should be done until analytical results were available.

Sampling commenced the afternoon of March 14, 1988. TAT collected a total of 11 discrete soil/sludge samples from several locations throughout the site. See Attachment D for exact locations and descriptions. Each sample was collected in triplicate, with split samples being delivered to HK&C and LADHS representatives accompanied by appropriate chain-of-custody. All samples were collected by utilizing a new sampling trowel at each location. Each sample was placed in a clean mixing bucket and mixed for homogenization purposes. They were then split into three, lot numbered, specifically cleaned, I-Chem, glass jars with teflon lined lids. Field duplicate samples and a background sample were collected in the same manner. The samples retained by TAT were sealed with custody tape and stored on ice until delivery to the contracted laboratory. Sample collection was performed in Level C protection and all sampling activities were photodocumented (see Attachment E). TAT submitted the samples to a certified laboratory under Special Projects TDD# T098803-104. The samples were analyzed for Title 22 Metals (TTLC Limits) including hexavalent chromium, fluoride, and soil pH. Sample S-1 also had the Title 22 Waste Extraction Test run to determine leachable levels of contaminants. The table below illustrates those samples containing elevated levels. Generally, the samples contained excessive levels of copper, lead, and zinc. High concentrations of beryllium and cadmium were also encountered in some of the samples. See Attachment F for a copy of the complete laboratory report.

ELEVATED CONTAMINANTS - TOTAL THRESHOLD LIMIT CONCENTRATIONS

SAMPLE ID	BERYLLIUM	CADMIUM	COPPER	LEAD	ZINC
D-1	114	-	21,200	2,900	99,800
S-1	178	-	13,600	3,060	137,000
P-1	283	-	8,450	1,600	90,800
C-1	-	-	119,000	48,800	27,200
B-1	-	909	8,900	43,500	473,000
F-1	-	-	130,000	11,600	96,600
SP-1	-	-	-	2,490	15,700
TTLC LIMIT	75	100	2,500	1,000	5,000

** All values in mg/Kg **

The leaking drums and laboratory chemicals were addressed on March 15, 1988. The workplan involved a Level B entry to stage the chemicals outside the laboratory building. TAT addressed safety concerns during the site safety meeting prior to the site entry. ESFD personnel were on stand-by with fire hoses in the event of a fire or exposure. TAT staged the containers and LADHS personnel recorded label information and physical descriptions on inventory sheets. Unmarked and unidentifiable containers were field tested by TAT to determine the hazardous characteristics of the unknown contents. A total of 61 containers were inventoried. A complete container inventory is listed in Appendix G. The chemicals were re-staged in compatible groupings on the laboratory counters and the building was boarded shut.

The final on-site activity centered around the leaking drums of petroleum products. The drums were inspected and opened in Level B protection. The contents of eight drums were sampled and field tested for the presence of PCB's using Chlor-n-Oil test kits. All of the samples tested negative. It appeared that all of the drums contained waste oil/water mixtures. An underground tank was also sampled and contained material suspected to be diesel fuel.

At this point is is unclear as to what responsibilities Aero has agreed to assume. Aero's involvement to date has been limited to securing the fence and storing equipment. They have not submitted a workplan to ESFD and are reportedly waiting for direction from the EPA. HK&C representatives have stated that Woodward-Clyde Consultants, under contract to HK&C, will develop a site characterization and site mitigation workplan after receiving laboratory analysis data from the split samples delivered by TAT.

Upon receipt, the analytical results of the solid wastes were reported and discussed with OSC Shane to determine further EPA/TAT involvement. OSC Shane is currently preparing a CERCLA 106 enforcement order for delivery to HK&C. Future activities will be centered around conducting an off-site contaminant migration investigation utilizing a field portable X-Ray Fluorometer. TAT was also tasked to assemble a preliminary cost comparison of potential removal options. These figures are illustrated in Attachment H.

If you have any further questions regarding this interim site assessment report, please do not hesitate to contact this office.

Sincerely,

R Randall

Randy Randall
Technical Assistance Team Member

RR:

cc: D. Shane
File

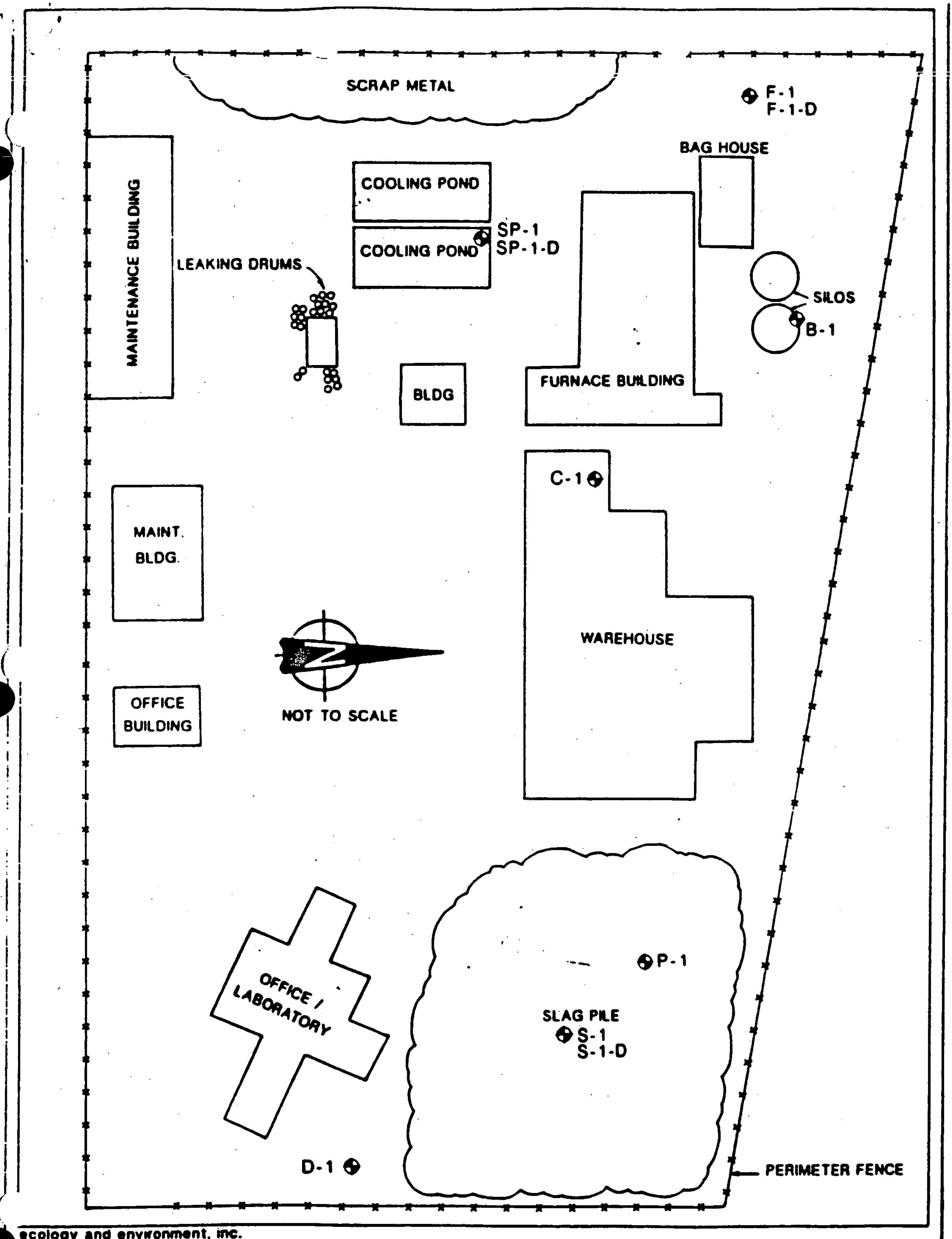


FIGURE 3
SAMPLE LOCATION MAP
H. KRAMER and COMPANY

Sample Collection Summary
H. Kramer and Company

Sample ID	Sample Location
D-1	Surface composite of drainage area; southeast corner of slag pile
S-1	Surface composite of slag pile; collected from four compass points of slag pile
S-1-D	Field duplicate of S-1
P-1	Grab sample from an excavated area near the west end of slag pile; approximately four feet below surface
C-1	Composite sample of soil around metal crusher located in northeastern most building
B-1	Grab sample collected from beneath the eastern baghouse dust silo
F-1	Composite sample of material beneath furnace located at the northwest corner of property
F-1-D	Field duplicate of F-1
SP-1	Composite sample of cooling pond sludge; collected from northeast corner of eastern cooling pond
SP-1-D	Field duplicate of SP-1
BG-1	Background sample collected from an area next to Eaton Consolidated Controls Products driveway at the end of Douglas Street

Note: All samples collected in triplicate with split samples being delivered to LADHS and HK&C.

REFERENCE # 11

PIC ENVIRONMENTAL SERVICES

714/842-6331
714/842-6537 FAX

PRELIMINARY ENDANGERMENT ASSESSMENT REPORT

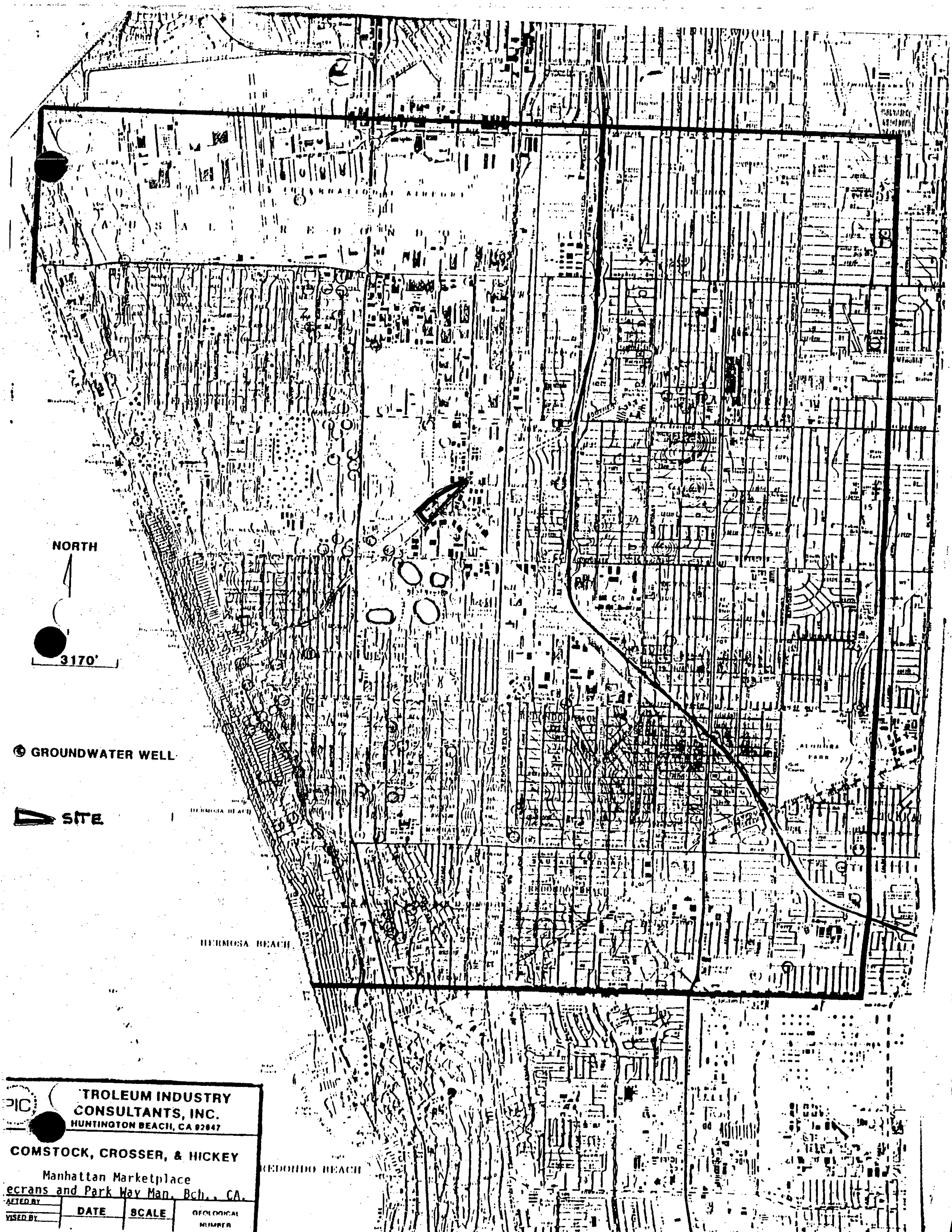
FOR

COMSTOCK, CROSSER AND HICKEY DEVELOPMENT COMPANY

MANHATTAN MARKETPLACE
Rosecrans and Park Way
Manhattacn Beach, California

March 13, 1990

PIC ENVIRONMENTAL SERVICES
7261 MARS DRIVE
HUNTINGTON BEACH, CA 92647



TROLEUM INDUSTRY
CONSULTANTS, INC.
HUNTINGTON BEACH, CA 92647

COMSTOCK, CROSSER, & HICKEY

Manhattan Marketplace
ecrans and Park Way Man. Bch., CA.

AFTED BY	DATE	SCALE	GEOLOGICAL NUMBER
VISED BY			

REFERENCE # 1 2

CONTACT REPORT

AGENCY/AFFILIATION: City of Hawthorne		
DEPARTMENT: Water Department		
ADDRESS/CITY: 4455 West 126th Street, Hawthorne		
COUNTY/STATE/ZIP: Los Angeles County, California 90250		
CONTACT(S)	**TITLE**	**PHONE**
1. Mark Arseneau		(2130 970-7902
2.		
E & E PERSON MAKING CONTACT: Jeffrey Muller		DATE: 12/19/89
SUBJECT: Wells #4, 8, 12, and 13		
SITE NAME: Allied Chemical Corp, El Segundo Works H. Kramer & Company		EPA ID#: CAD008326589 CAD008260267

Water from City of Hawthorne wells #4, 8, 12 and 13 is treated, blended and combined with Municipal Water District (MWD) water. Overall, approximately 75 to 85 percent of the City of Hawthorne's water comes from the MWD.

WELL NUMBER	STATE WELL NUMBER	PERFORATIONS
#4	3S/14W-09N04S	306-316 354-356 364-370 396-402
#8	3S/14W-09P01S	not available
#12	3S/14W-09N04S	300-350
#13	3S/14W-09M01S	282-438

The water system serves approximately 37,000 people in the City of Hawthorne.

F474

REFERENCE #13

CONTACT REPORT

AGENCY/AFFILIATION: Southern California Water Company	
DEPARTMENT:	
ADDRESS/CITY: 3625 West 6th Street, Los Angeles	
COUNTY/STATE/ZIP: Los Angeles County, California, 90020	

CONTACT(S)	TITLE	PHONE
1. Frank Costas		
2.		

E & E PERSON MAKING CONTACT: Louise Flynn	**DATE:** 01/05/90
SUBJECT: Wells	
SITE NAME: Northrop-KB H. Kramer & Company	**EPA ID#:** CAD980665582 CAD008260267

The Southern California Water Company system is gridded, which means that it is blended with Municipal Water District Water in part, but some water goes directly from the wells to a storage facility and out to homes.

WELL	STATE ID NUMBER	PERFORATIONS	POPULATION SERVED
Chadron #1	3S/14W-22A01S	319-668	10,000
Chadron #2	3S/14W-22A02S	325-676	10,000
Chicago	3S/14W-21N01S	399-435	5,000
Compton	3S/14W-22L01S	352-458	7,000
Dalton #1	3S/14W-25P04S	544-744	6,000

REFERENCE # 14

CONTACT REPORT

AGENCY/AFFILIATION: Southern California Water Company		
DEPARTMENT:		
ADDRESS/CITY: 3625 West 6th Street, Los Angeles		
COUNTY/STATE/ZIP: Los Angeles County, California 90020		
CONTACT(S)	TITLE	PHONE
1. Frank Costas		(213) 251-3631
2.		
E & E PERSON MAKING CONTACT: Louise Flynn		DATE: 01/26/90
SUBJECT: Well 3S/14W-14A01S		
SITE NAME: Northrop-AK H. Kramer & Company		EPA ID#: CAD000627398 CAD008260267

The well called El Segundo (3S/14W-14A01S) is in a gridded system. Water in this system is partially blended with Municipal Water District water. This well is perforated at 100 to 395 feet below ground surface, and serves a population of approximately 5,000 people.

REFERENCE # 15

CONTACT REPORT

AGENCY/AFFILIATION: City of Torrance		
DEPARTMENT: Water District		
ADDRESS/CITY: 3031 Torrance Boulevard, Torrance		
COUNTY/STATE/ZIP: Los Angeles County, California 90503		
CONTACT(S)	**TITLE**	**PHONE**
1. Chuck Schaich		(213) 618-2859
2.		
E & E PERSON MAKING CONTACT: Christopher R. Harner		DATE: 02/07/90
SUBJECT: Wells #4, 5 and 6		
SITE NAME: Allied Chemical Corp., El Segundo Works H. Kramer & Company		EPA ID#: CAD008326589 CAD008260267

City of Torrance wells #4, 5 and 6 are all in the same system. The system serves approximately 25,000 customers in Torrance north of Artesia Boulevard.

Water from the system is blended with Municipal Water District water prior to distribution.

WELL NUMBER	STATE ID NUMBER	PERFORATIONS
#4	4S/14W-10K02S	200-800
#5	4S/14W-10K03S	200-800
#6	3S/14W-34C02S	200-800

REFERENCE # 16

CONTACT REPORT

AGENCY/AFFILIATION: California Water Service Company		
DEPARTMENT:		
ADDRESS/CITY: 1221 South Pacific Coast Highway, Redondo Beach		
COUNTY/STATE/ZIP: Los Angeles County, California 90277		
CONTACT(S)	**TITLE**	**PHONE**
1. Bert Mason	Production Superintendent	(213) 316-5686
2.		
E & E PERSON MAKING CONTACT: Louise Flynn		DATE: 01/05/90
SUBJECT: Wells #22, 30 and 802		
SITE NAME: Northrop-KB H. Kramer & Company		EPA ID#: CAD980665582 CAD008260267

California Water Service blends part of its system with Metropolitan and Colorado River Water. The immediate area around a well probably receives all groundwater. Of the total water used, probably 15 to 25 percent is groundwater. Mr. Mason estimates that approximately 25 percent of their 25,000 service connections receive groundwater.

WELL NUMBER	STATE ID NUMBER	PERFORATIONS
#22	3S/14W-29J01S	192-600
#30	3S/14W-29H01S	315-415
#802	3S/14W-32A02S	170-330

REFERENCE # 17

CONTACT REPORT

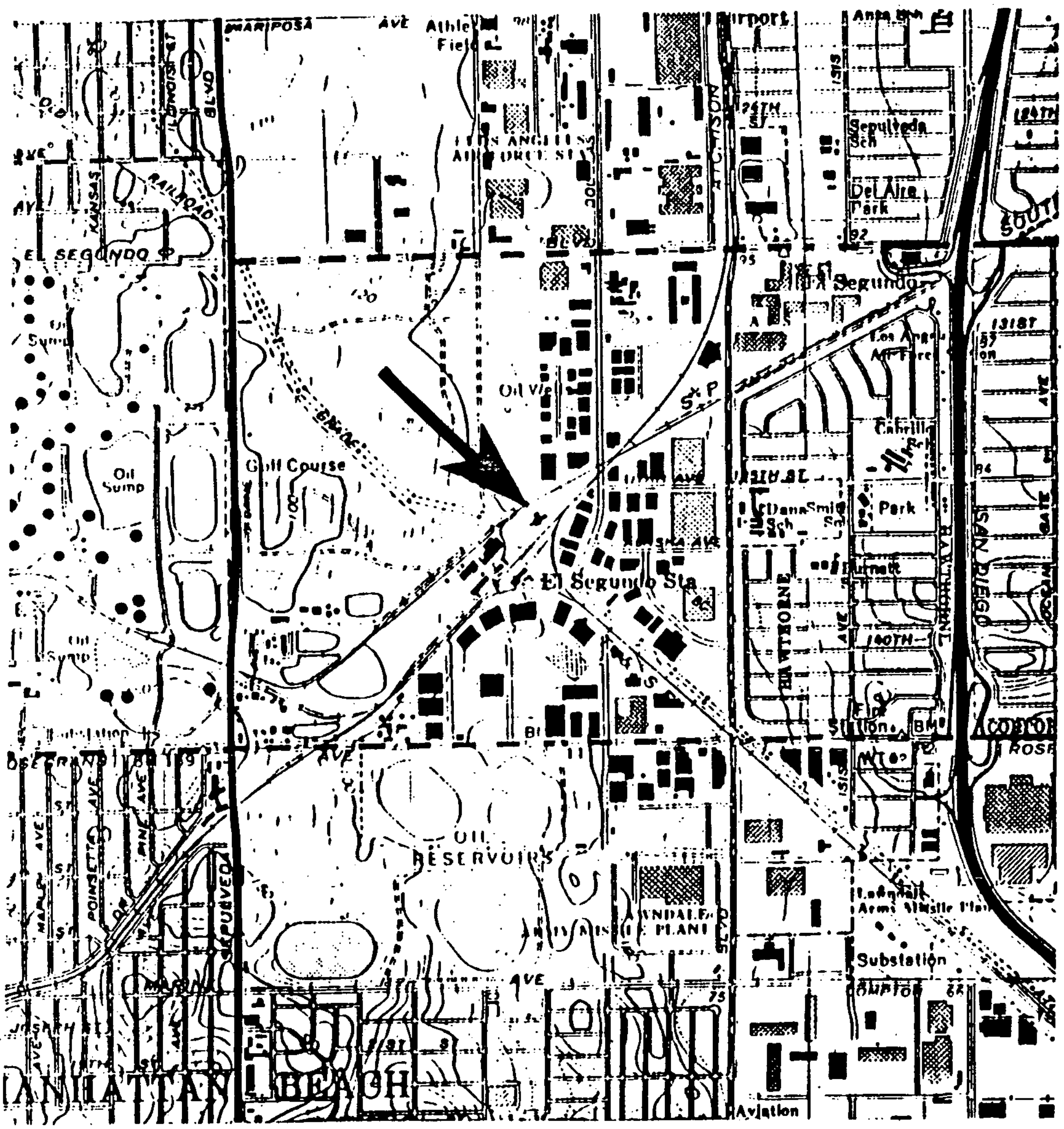
AGENCY/AFFILIATION: City of Manhattan Beach		
DEPARTMENT: Municipal Water Supply		
ADDRESS/CITY: 1400 Highland Avenue, Manhattan Beach		
COUNTY/STATE/ZIP: Los Angeles County, California 90266		
CONTACT(S)	TITLE	PHONE
1. Bob Erikson		(213) 545-6521
2.		
E & E PERSON MAKING CONTACT: Christopher R. Harner		DATE: 05/14/90
SUBJECT: Well 3S/14W-29C03S		
SITE NAME: H. Kramer & Company		EPA ID#: CAD008260267

Well #15 (3S/14W-29C03S) has perforations at 210-300 and 375-420 feet below ground surface.

Well water is mixed with Municipal Water District Water (MWD) prior to distribution to the entire city of Manhattan Beach (approximately 43,000 people.) Alternate water sources are available from MWD. Well water usually only supplies about 15 percent of the total water supply.

REFERENCE # 18

SITE LOCATION



SCALE 1:24 000

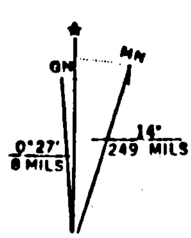
1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

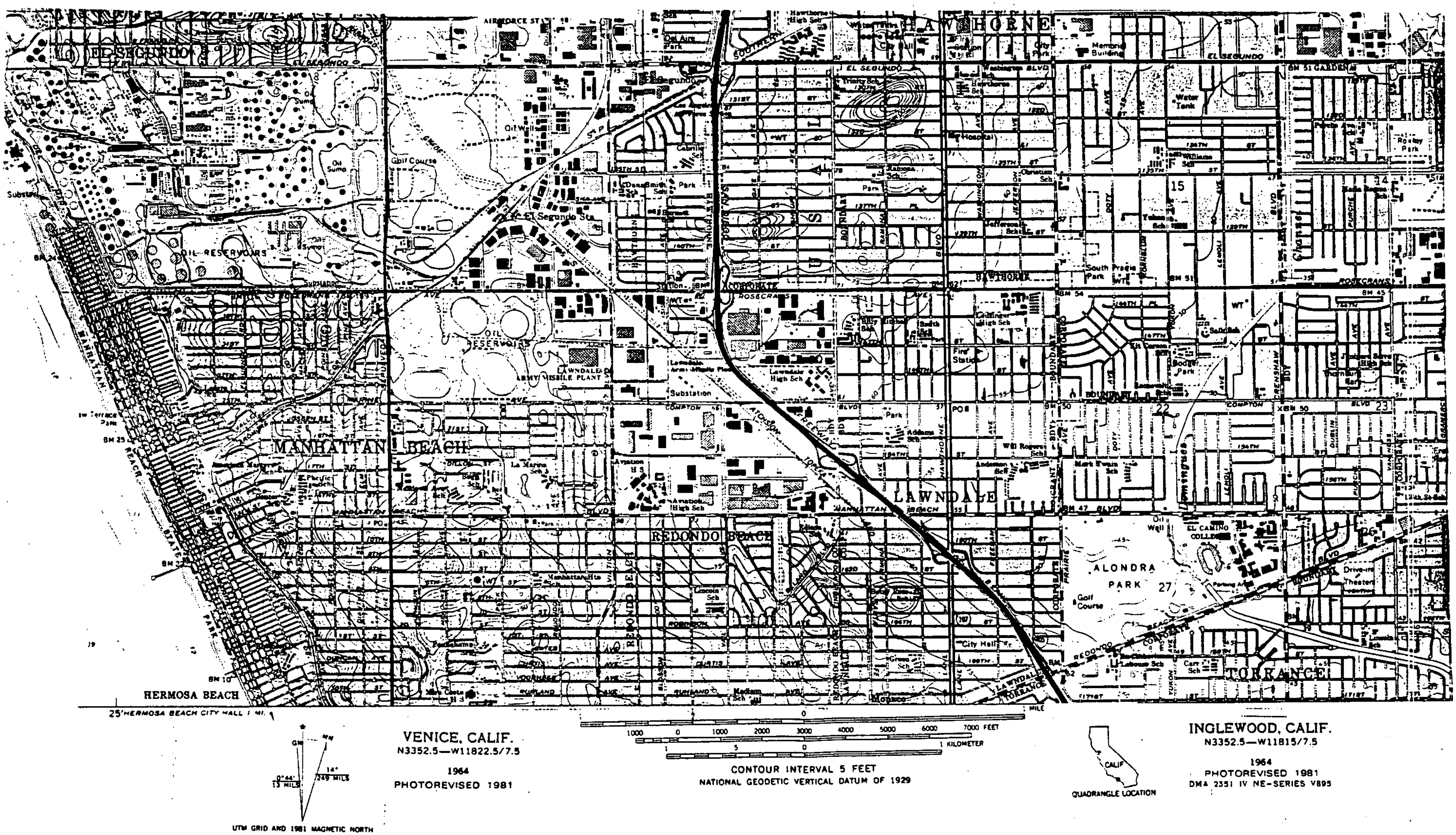


H. KRAMER & COMPANY
1 Chapman Way
El Segundo, California

VENICE, CALIF.
N3352.5—W11822.5/7.5

1964
PHOTOREVISED 1981
DMA 2351 IV NW—SERIES V895

SITE INITY

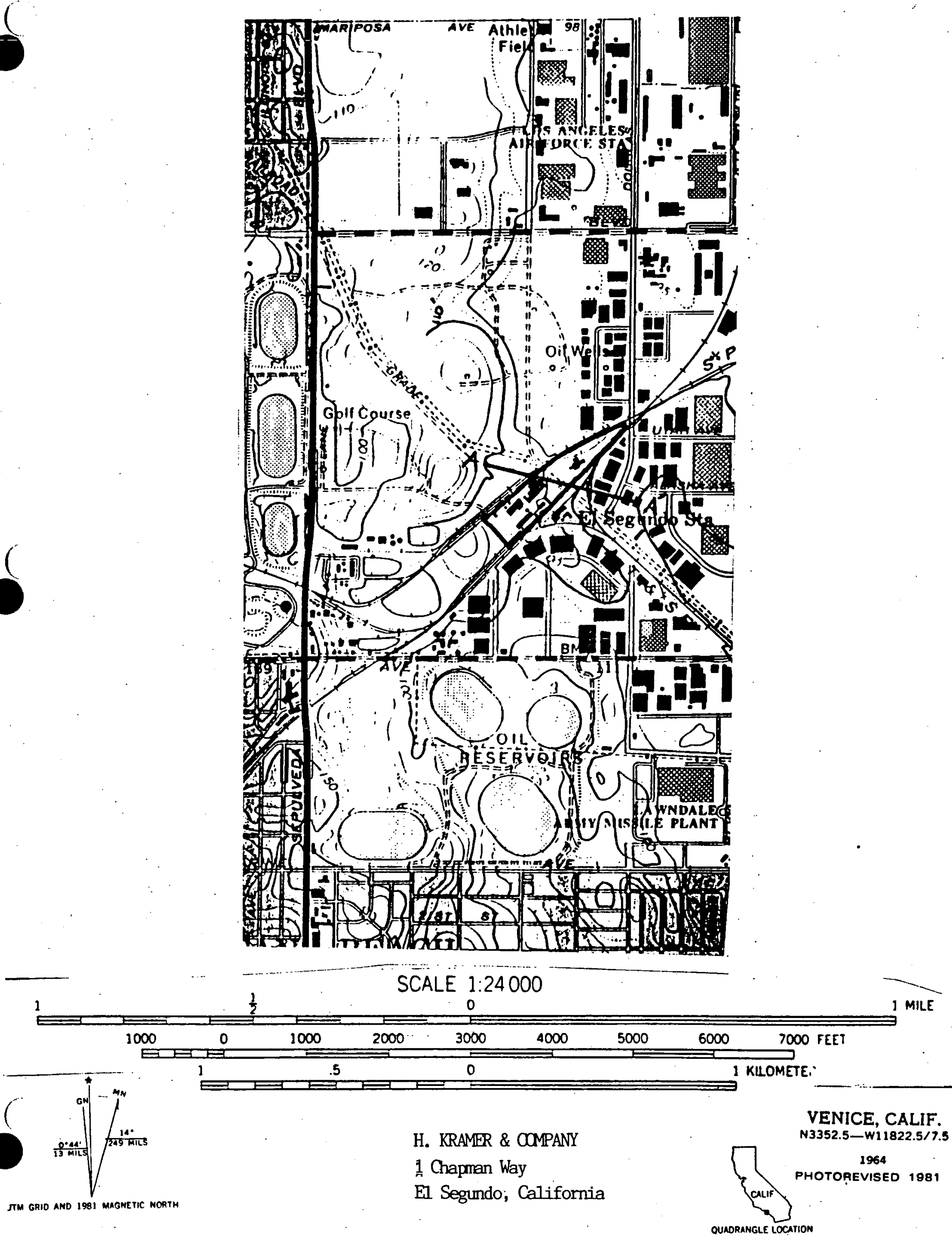


H. KRAMER & COMPANY

1 Chapman Way

El Segundo, California

SITE SLOPE



H. KRAMER & COMPANY
1 Chapman Way
El Segundo, California

Average Slope of Facility in Percent

Line of slope is drawn from A to A′ across the site in order to give a rise and run which can be easily calculated to find an average slope over that distance. Both A and A′ were chosen in such a manner that the line of slope crosses the contour lines nearly perpendicularly in order to simulate flow lines.

rise A to A′ 110 ft − 80 ft = 30 ft.

run A to A′ 1900 ft

$$\frac{\text{rise}}{\text{run}} = \frac{30\text{ ft}}{1900\text{ ft}} = .0158$$

slope = .0158 x 100 = 1.58%

Average Slope between facility and Surface Water

The elevation of the H. Kramer site is 100 ft. The elevation of the nearest point of the Dominguez channel is 50 ft. The distance between the two points is 14,600 ft.

$$\frac{\text{rise}}{\text{run}} = \frac{50\text{ ft}}{14600\text{ ft}} = .0034$$

slope = .0034 x 100 = .34%

REFERENCE # 19

Don Shane

Purpose: CERCLA Preliminary Assessment

Site: H. Kramer and Company
1 Chapman Way
El Segundo, California 90245
Los Angeles County

Site EPA ID Number:	CAD008260267
TDD Number:	F9-9003-040
Program Account Number:	FCA1097PAA
FIT Investigator:	Christopher R. Harner, Ecology and Environment, Inc.
Report Prepared By:	Christopher R. Harner, Ecology and Environment, Inc.
Through:	Paul Brown, Ecology and Environment, Inc.
Report Date:	June 25, 1990
FIT Review/Concurrence:	James M. James 7/9/90
Submitted To:	Lisa Nelson Site Assessment Manager EPA, Region IX

ecology and environment, inc.
160 SPEAR STREET, SAN FRANCISCO, CALIFORNIA 94105, TEL. 415 777-2811
International Specialists in the Environment
recycled paper

1. INTRODUCTION

Under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), the U.S. Environmental Protection Agency (EPA) has tasked Ecology and Environment, Inc.'s Field Investigation Team (FIT) to conduct a Preliminary Assessment of the H. Kramer & Company site in El Segundo, California. This report summarizes FIT's investigative efforts.

2. SITE DESCRIPTION

2.1 SITE LOCATION AND DESCRIPTION

The H. Kramer & Company (Kramer) site is located at 1 Chapman Way, El Segundo, California, (Township 4 South, Range 14 West Section 18, latitude 33° 54' 30", longitude 118° 23' 00".) The abandoned site occupies approximately 8.3 acres between the Southern Pacific Railroad line to the north and the Atchison, Topeka and Santa Fe Railroad line to the south, in an industrial and commercial area of southeast El Segundo (refer to Figure 2-1, Site Location Map) (1, 2).

2.2 FACILITY PROCESSES/WASTE MANAGEMENT AND OWNER/OPERATOR HISTORY

2.2.1 HISTORICAL

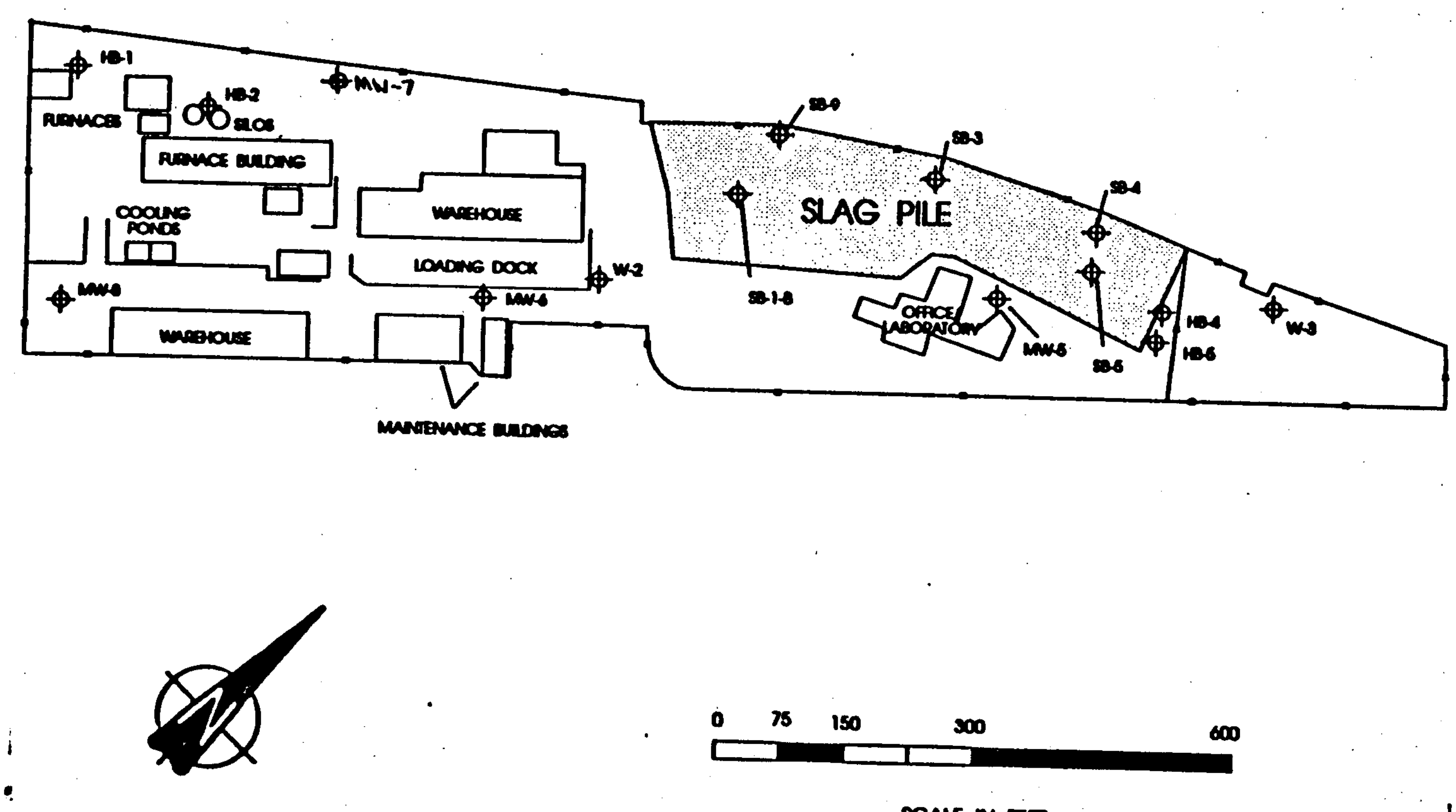
Not much is known about past facility processes or waste management practices. According to aerial photographs, the site was developed as early as 1941. Prior to 1951, the site was owned by Harshaw Chemical Company. The only known activity taking place at the site during this time was the extraction of antimony from ore (3).

In 1951, H. Kramer & Company purchased the site from Harshaw Chemical Company and operated a brass and bronze foundry at the site until 1985 (3, 4). Apparently, an arsenic pond formerly operated by Harshaw Chemical was incorporated into a waste pile for the industrial slag produced at the foundry, (refer to Figure 2-2, Facility Map.)

The site was abandoned in 1986, shortly after H. Kramer & Company entered bankruptcy proceedings under Chapter 11 of the Bankruptcy Code (4). The structures and equipment used during brass foundry operations and waste were left on site. The abandoned wastes included: 75 decaying waste oil drums, various laboratory chemicals, a slag pile, process dust, furnace ash and cooling pond sludge (4, 5, 6).

In March 1988, the United States Bankruptcy Court for the Northern District of Illinois authorized the sale of the site to Aero Industries, Inc. of Long Beach, California. Under the agreement, Aero was to

SOURCE: from ENSR Site Characterization Report, 1990



ecology and environment, inc.

Figure 2-2 FACILITY MAP
H. KRAMER & COMPANY
1 CHAPMAN WAY
EL SEGUNDO, CA 90245

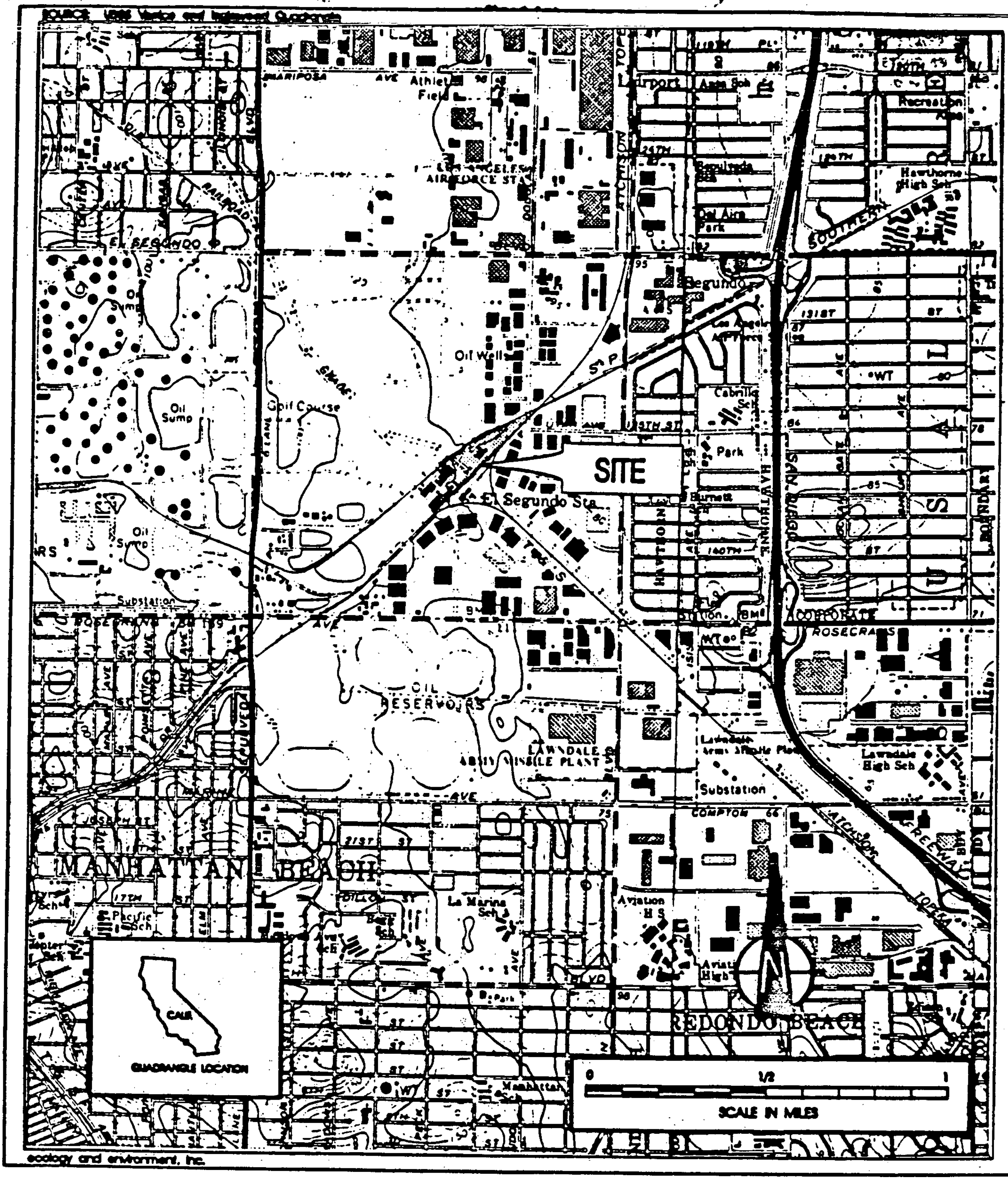


Figure 2-1 SITE LOCATION MAP
H. KRAMER & COMPANY
1 CHAPMAN WAY
EL SEGUNDO, CA 90245

purchase the property and raze, dismantle and remove the existing buildings and equipment (4).

However, EPA directed Kramer and all involved parties to cease all closure activities in order to prevent or mitigate harm to human health and the environment, (see section 2.2.3 REGULATORY INVOLVEMENT,) (7).

On April 3, 1990, in compliance with EPA directions, a site characterization of the abandoned site was completed by the contractor for H. Kramer & Company (8).

2.2.2 CURRENT

The site is currently inactive, pending regulatory decisions regarding the remediation and closure of the site. Waste oil, deposited in 17 5-gallon or smaller containers, and 42 55-gallon drums and all investigation-derived wastes are staged in the warehouse next to the furnace building (5). The wastes in the laboratory have been inventoried and the laboratory has been boarded shut (6). Nineteen "roll-off" bins each containing 18 to 20 tons of heavy metal dust are presently staged in front of the loading dock (9).

2.3 REGULATORY INVOLVEMENT

A routine inspection of the abandoned site by the El Segundo Fire Department revealed that conditions at the site were creating a public hazard under the Uniform Fire Code, Article 80 (5).

Subsequently, Los Angeles County Health Services Department (LACHSD) Hazardous Materials Control Program was notified and directed H. Kramer & Company to take corrective actions including the submission of a site assessment and remediation proposal (4, 5).

The site was listed in CERCLIS in 1989, following a request by LACHSD for EPA involvement. EPA Region IX Emergency Response Section directed Ecology and Environment Inc.'s Technical Assistance Team (TAT) to conduct a preliminary assessment to determine the need for EPA involvement (6).

Based on observations made by TAT during the preliminary assessment tour, EPA directed TAT to conduct a site assessment of the abandoned site. During the site assessment, TAT, with LACHSD assistance, sampled the sludge pits and the leaking waste oil containers, and inventoried the laboratory chemicals (6). Data collected during the investigation prompted EPA to issue CERCLA Section 106 Administrative Order Number 88-17, directing H. Kramer & Company to cease all activities on site and submit to EPA a written proposal for the razing, demolition and salvaging of buildings, equipment and materials at the facility (7).

There is no current state lead agency. Since EPA's Emergency Response Section is currently the lead agency, neither the California Department of Health Services (DOHS), nor the Los Angeles Regional Water Quality Control Board (RWQCB) are currently involved in regulating this site.

The site is not listed in the RCRA database or on the California State Bond Expenditure Plan (10, 11, 12, 13).

3. APPARENT PROBLEM

The H. Kramer & Company site was entered into the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) when the Los Angeles County Department of Public Health requested that EPA become involved with the site. At that time, the Los Angeles County Department of Public Health was concerned that the abandoned site posed a threat to public heath and safety.

The results of a site characterization performed for H. Kramer & Company in November 1989 found heavy metals in a variety of soil and groundwater samples. The slag piles contain an unknown amount of inadequately contained heavy metals which have potential to contaminate air, groundwater and surface water. In addition, arsenic contaminated soil and groundwater have been detected below the slag piles (8).

4. HRS FACTORS

The Hazard Ranking System (HRS) is a scoring system used to assess the relative threat associated with actual or potential releases of hazardous substances from sites. It is the principal mechanism EPA uses to place sites on the National Priorities List (NPL). EPA has proposed revisions to the HRS, pursuant to the Superfund Amendments and Reauthorization Act of 1986 (SARA). FIT has evaluated the following proposed revised HRS factors relative to this site.

4.1 WASTE TYPE AND QUANTITY

The slag piles contain varying concentrations of heavy metals, including barium, chromium and lead. In addition, soil samples taken below the slag pile indicate arsenic contamination to depths of 20 feet beneath the ground surface (bgs) (8). The total quantity of hazardous substances associated with the slag pile is not known. FIT estimates the dimensions of the slag pile to be approximately 150 feet by 650 feet, or a surface area of 97,500 square feet.

The following table summarizes the highest levels of metals found in slag pile soil samples (8).

TABLE 4-1

Slag Pile Soil Sample Analysis Results

ANALYSIS	HIGHEST LEVEL (mg/Kg) DETECTED IN SAMPLES	BACKGROUND (mg/Kg)	TTLC (mg/Kg)
ANTIMONY	1,000	ND (<1.0)	500
ARSENIC	2,800	0.95	500
BARIUM	501	ND (<0.05)	10,000
CHROMIUM	74.6	1.5	500
LEAD	2,500	0.54	1,000

ND - not detected   TTLC - Total Threshold Limit Concentration

There are a total of 19 roll-off bins each containing 18 to 20 tons of heavy metal dust currently stored on site. A total of 2,395 gallons of waste oil in various 5-gallon and 55-gallon drums and an unknown quantity of cooling pond sludge also remain on site (9).

4.2 GROUNDWATER

The H. Kramer & Company site is located in the western portion of the West Basin of the Coastal Plain of Los Angeles County. Groundwater bearing geologic formations common to this area include the Recent-age active dune sand and the Pleistocene-age marine and continental deposits of the Older Dune sand, Lakewood and San Pedro formations (14, 15).

Physiographic features in the El Segundo area are dominated by both Older dune sand and active sand dunes. While much of the surface has eroded, many natural depressions once part of active sand dunes still remain. The Old Dune Sand aquifer is the uppermost water bearing stratum (14).

The Lakewood formation lies beneath the Older Dune sand formations and includes all upper Pleistocene strata except Old Dune sand (15). The uppermost stratum of the Lakewood formation is the Manhattan Beach formation, formerly referred to as the Bellflower aquiclude (14). Locally, the formation is a multi-layered assemblage with varying amounts of clay, silt and very fine sand (14). The lowest member of the Lakewood formation near the site is the Gage aquifer. Hydraulic connection between the Gage aquifer and the Old Dune Sand aquifer is possible in areas where the Manhattan Beach formation is absent, very thin, or consists of very fine sand (14).

The San Pedro formation sediments are composed of marine sand, gravel, sandy silt, and clay. The uppermost unit of the San Pedro formation is the El Segundo aquitard. Locally, the El Segundo aquitard has multiple layers of clay separated by silt and clayey-silt (14). The underlying Silverado aquifer consists of granitic blue-gray sands and gravels interbedded with lenses of clay, silt, and sandy silt. The aquifer is located 300 feet bgs near the site (15). Due in part to its high transmissibility rate, the Silverado is widely used as a groundwater resource in the area (15). The Silverado and Gage aquifers are merged within 2 miles of the site (15).

The stratigraphy between the Old Dune Sand aquifer and the Silverado aquifer in the general location of the site has been estimated by FIT using information available during this investigation (14,15):

TABLE 4-2

Selected Local Stratigraphy

LAYER DESCRIPTION	THICKNESS (feet)	HYDRAULIC CONDUCTIVITY (cm/sec)	SORBENT CONTENT
sandy silts	10	1×10^{-4}	15%
sand	10	1×10^{-4}	15%
gravel	50	1×10^{-2}	3%
sand	18	1×10^{-4}	15%

The annual net precipitation for the area is 3.69 inches (16, 17).

Groundwater from the Silverado aquifer near El Segundo is widely used as a drinking water resource. The nearest well, operated by the City of Manhattan Beach, is located about 1.5 miles from the site. Wells near the site are generally blended with Municipal Water District (MWD) water, although some wells are in gridded systems which are partially blended with MWD water but serve a specific area. Wells within 4 miles of the site serve as many as 169,000 customers in portions of Los Angeles County (18, 19, 20, 21, 22, 23). Table 4-3 summarizes well use within 4 miles of Kramer.

TABLE 4-3

Selected Wells within 4 Miles of the Site and the Populations Served

WELL OWNER	NEAREST WELL	DISTANCE (miles)	PERFORATIONS	POPULATION SERVED
City of Manhattan Beach	#15	1.5	210-300 375-420	43,000 (blended)
City of Hawthorne	#4	1.75	306-316 354-356 364-370 396-402	37,000 (blended)
Southern Cal. Water Company	Compton	1.5	352-676	7,000 (gridded)
	Chicago	2	399-435	5,000 (gridded)
	Chadron #1	2	319-676	10,000 (gridded)
	Chadron #2	2	325-658	10,000 (gridded)
	Dalton #1	3	544-744	6,000 (gridded)
	El Segundo	3	100-305	5,000 (gridded)
California Water Service Company	#802	3	170-330	21,000 (gridded)
City of Torrance	#4, #5	3	200-800	25,000 (blended)

*A gridded system is partially blended and serves a specific area.

During the Site Characterization conducted for H. Kramer & Company in 1989, a total of 29 borings were drilled and soil samples were collected at each. Of these soil borings, 5 were converted into monitoring wells. Groundwater samples from the 5 new wells and 3 existing wells were also collected. Analysis of all but one of these wells documents arsenic, chromium and selenium contamination in groundwater above health-based benchmarks (8). A summary of the analytical results is presented in the following table.

TABLE 4-4

Old Dune Sand Aquifer Analytical Results

ANALYSIS	GROUNDWATER SAMPLE RESULTS (mg/L) DOWNGRADIENT			UPGRADIENT	MCL
	MW2	MW3	MW5	MW7	(mg/L)
ARSENIC	12	9.8	140	0.011	0.05
CHROMIUM	0.21	ND<0.02	ND<0.02	ND<0.02	0.05
SELENIUM	0.24	0.19	0.02	ND<0.02	0.01

ND - not detected MCL - Maximum Contaminant Level

Although well MW7 is upgradient from the slag pile, analytical results suggest it may not be upgradient from the former arsenic pond since arsenic was detected in this well.

While there is evidence for hydraulic interconnection of the contaminated Old Dune Sand aquifer and the underlying Gage aquifer, neither aquifer is used as a drinking water resource. However, there is evidence that the Gage and Silverado aquifers are merged within 2 miles of the site. Furthermore, the Silverado is widely used as a drinking water resource in the area. Therefore, there is evidence suggesting that an observed release to groundwater may have occurred.

4.3 SURFACE WATER

4.3.1 POTENTIAL TO RELEASE

The H. Kramer & Company site is located on the El Segundo Sand Hills, a coastal sand dune formation with numerous natural depressions, but no natural surface water bodies; it is in an area of minimal flooding with a 2-year, 24-hour rainfall of 2.5 to 3.0 inches (24, 25). The Pacific Ocean is approximately 1.4 miles west of the site.

The H. Kramer & Company site is located at a lower elevation than most of the surrounding area (8). In the past, an illegally constructed culvert at the northeast end of the property delivered rainwater runoff from the site to the County stormwater drain system. This culvert has since been temporarily capped (9). The County drainage system feeds into Dominguez Channel 3.2 miles east of the site. Dominguez Channel flows south to Long Beach Harbor and Los Angeles Harbor 14 miles downstream from the site (28).

Dominguez Channel, Los Angeles Harbor and Long Beach Harbor are not used for drinking or irrigation and none of them can be considered a sensitive environment. Both Los Angeles Harbor and Long Beach Harbor are used for recreational boating and sport fishing. Commercial fishing along the Pacific Coast within 1 mile of the harbors produces 95,802 pounds of fish per year (26).

No analytical data exists to determine whether a release of hazardous substances to surface water has occurred from the site through the storm drains, although such a release may have occurred.

4.4 AIR

The H. Kramer & Company site is bordered by several industrial facilities. The nearest residential area is located in Hawthorne, approximately 0.3 miles east of the site. The nearest park is Del Aire Park, located about 0.7 miles from Kramer. The Chevron Refinery, located approximately 0.125 miles west of the site is a habitat for Euphilotes battoides allyni, the El Segundo Blue Butterfly, a listed Federal endangered species (1, 2, 27).

The estimated population near Kramer is presented in the following table (28):

TABLE 4-5

Estimated Worker and Resident Population Within 4 miles of the Site

DISTANCE FROM SITE	ESTIMATED POPULATION
0 to 0.5	50
0.5 to 1	477
1 to 2	77581
2 to 3	100409
3 to 4	196764

No air sampling has been conducted at the Kramer site. There is a high potential for the release of heavy metals from the slag pile since the pile is exposed to the atmosphere.

4.5 ON-SITE

A total of 5 shallow hand borings where drilled during the Site Characterization. Soil samples were collected from each at 1 foot and 3 feet bgs. Analysis of the samples indicate heavy metal contamination at 1 foot bgs throughout the Kramer site. Except for the slag pile, most of the site is asphalt or concrete paved. Samples collected adjacent to the slag piles (HB4, HB5) contain much higher concentrations of heavy metals than samples collected near the furnaces (HB1, HB2,) (refer to Table 4-6) (8). Therefore, it appears that high concentrations of heavy metals near the surface are associated with the slag pile.

TABLE 4-6

Analysis of Soil Samples Collected 1 Foot Below Ground Surface

ANALYSIS	SOIL SAMPLE RESULTS (mg/Kg) HB1	HB2	HB4	HB5	TTLC (mg/Kg)
ANTIMONY	2.8	25	17.1	334	500
ARSENIC	1.5	6.3	24	79	500
LEAD	4	7.5	77.7	118	1000

TTLC - Total Threshold Limit Concentration

The Kramer site is enclosed around its entire perimeter by a fence with barbed wire strung around its top. The site is patrolled by security guards on a 24-hour basis (4).

The Kramer site is surrounded by mostly industrial properties. However, some of the adjacent property owners have apparently not maintained adequate security for their parcels, thus allowing access to Kramer (4). The populations within 1 mile of the site which may have access to the abandoned facility are presented in the table below (28).

TABLE 4-7

Nearby Population Within 1 Mile of the Site

DISTANCE (miles)	ESTIMATED POPULATION
0 to .25	0
.25 to .5	50
.5 to 1	477

There is no resident population, and there is a low likelihood of exposure of nearby populations to on-site contamination since the site is fenced and the area surrounding the site is only sparsely populated.

5. SUMMARY OF FIT INVESTIGATIVE ACTIVITIES

FIT reviewed and obtained copies from TAT files of the Kramer site. In addition, FIT contacted LACHSD, DOHS and RWQCB for information regarding local regulatory agency involvement with the site.

No site reconnaissance was deemed necessary due to extensive EPA Emergency Response Section involvement at the site.

6. EMERGENCY RESPONSE CONSIDERATIONS

Available information has been utilized to evaluate the relative threat to human health and the environment posed by the possible releases of hazardous substances from the Kramer site.

On March 15, 1988, TAT and LACHSD inventoried and re-staged a total of 61 containers of chemicals, each under 1 gallon in size. These were left in the laboratory on site. The building was then boarded shut (6). In addition, TAT inspected and field tested approximately 75 drums containing a total of 1,375 gallons of waste oil. The waste oil, which was found to be free of PCB's, was restaged inside the warehouse next to the furnace building (5, 6).

From April 1989 through May 1989, TAT monitored the cleanup of the abandoned site by contractors for Kramer. Cleanup activities included non-hazardous refuse removal and disposal, surface dust collection and pressure washing of the furnace building (5).

As a result of these emergency response and cleanup activities conducted by TAT and contractors for Kramer, this site no longer requires immediate removal action based on factors listed in the National Contingency Plan, 40 CFR 300.65(b)(2).

7. SUMMARY OF HRS CONSIDERATIONS

The H. Kramer & Company site in El Segundo, California, is an abandoned brass and bronze foundry which operated from 1951 to 1986. Little is known about past facility processes and waste management practices. A 97,500-square foot slag pile, various laboratory chemicals, an undetermined amount of cooling pond sludge, 2,395 gallons of waste oil and 380 tons of heavy metal dust remain on site.

EPA has issued CERCLA Section 106 Administrative Order Number 88-17 and has directed H. Kramer & Company, currently in bankruptcy proceedings, to develop a proposal for the remediation of the site. No long-term plans for remediation of the site have yet been finalized.

The H. Kramer & Company site's most significant HRS Considerations include the following:

- The unlined, uncovered industrial slag pile on site contains high concentrations of antimony, arsenic, barium, chromium and lead.

- Evidence exists to suggest an observed release of arsenic, chromium and selenium from the site to the Old Dune Sand aquifer. Contamination has been detected above health-based benchmarks.

- The Old Dune Sand aquifer may be hydraulically interconnected with the deeper Gage and Silverado aquifers through areas where the Manhattan Beach formation, which normally separates them, is absent.

- Groundwater occurring within 2 miles of the site in the is widely used as a drinking water resource.

- In the past, rainwater runoff from the site was directed to the Dominguez Channel to Long Beach Harbor and Los Angeles Harbor, which are both popular boating and sport fishing areas.

- Analytical results of the site characterization indicate heavy metal contamination at 1 foot below ground surface throughout the site.

8. EPA RECOMMENDATION

	Initial	Date
No Further Action under CERCLA		
High-Priority SSI under CERCLA	JML	7.25.90
Medium-Priority SSI under CERCLA		

Notes:

F474

9. REFERENCES

1. U.S. Geological Survey, Map of Venice, California, 7.5 Minute Series Quadrangle, 1964, (photorevised 1981).

2. U.S. Geological Survey, Map of Inglewood, California, 7.5 Minute Series Quadrangle, 1964, (photorevised 1981).

3. Thorne Environmental, "Work Plan for the Site Characterization of the H. Kramer Site, 1 Chapman Way, El Segundo, California," presented to Alschuler, Grossman and Pines, October 3, 1988.

4. Sutton, Linda, Alschuler, Grossman and Pines, letter to William Jones, Los Angeles County Health Services Department, April 6, 1988.

5. Ecology and Environment, Inc., "H Kramer and Company, On-Site Monitoring, Interim Report #1, El Segundo, California," submitted to William E. Lewis, Deputy Project Officer, U.S. Environmental Protection Agency, October 9, 1989.

6. Ecology and Environment, Inc., "H Kramer and Company, Site Assessment, El Segundo, California," submitted to William E. Levis, Deputy Project Officer, U.S. Environmental Protection Agency, May 16, 1988.

7. Zelickson, Jeff, Director, Toxics and Waste Management Division, U.S. Environmental Protection Agency, Region IX, "Order No. 88-17, to H. Kramer and Company, El Segundo, California," June 7, 1988.

8. ENSR Consulting and Engineering, "Report of Site Characterization for H. Kramer & Company Facility, El Segundo, California," prepared for Alschuler, Grossman and Pines, Counsel for H. Kramer & Company, February 1990.

9. Nelson, Erik A., ENSR Corporation, letter to Roger Klien, Assistant Regional Council EPA, re: Responses to Environmental Protection Agency Comments to the Report on Site Characterization for H. Kramer & Company Facility, El Segundo California, April 3, 1990.

10. Saebfar, Ahmib, California Department of Health Services, Toxic Substances Control Division, and Christopher R. Harner, Ecology and Environment, Inc., telephone conversation, May 14, 1990.

11. Ross, Jim, California Regional Water Quality Control Board, Los Angeles Region, and Christopher R. Harner, Ecology and Environment, Inc., telephone conversation, May 18, 1990.

12. Laguerta, Nestor, California Department of Health Services, and Christopher R. Harner, Ecology and Environment, Inc., personal communication and file search, May 18, 1990.

13. Francisco, Wendell, California Department of Health Services, and Christopher R. Harner, Ecology and Environment, Inc., telephone conversation, May 21, 1990.

14. Radian Corporation, "Additional Subsurface Investigation for the El Porto Section of Manhattan Beach Phase II," prepared for Chevron U.S.A. Inc., August 3, 1989.

15. California Department of Water Resources, Bulletin 104, Planned Utilization of the Groundwater Basins of the Coastal Plain of Los Angeles County, Appendix A, Groundwater Geology, 1961.

16. Federal Register, Vol. 53, No. 247, Proposed Rules, 52029-52030, December 23, 1988.

17. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Environmental Satellite Data and Information Service, National Climatic Data Center, Comparative Climatic Data for the United States Through 1985, Nashville, TN.

18. Arseneau, Mark, City of Hawthorne, Water Department, and Jeffrey Muller, Ecology and Environment, Inc., telephone conversation, December 19, 1989.

19. Costas, Frank, Southern California Water Company, and Louise Flynn, Ecology and Environment, Inc., telephone conversation, January 5, 1990.

20. Mason, Bert, California Water Service Company, and Louise Flynn, Ecology and Environment, Inc., telephone conversation, January 5, 1990.

21. Costas, Frank, Southern California Water Company, and Louise Flynn, Ecology and Environment, Inc., telephone conversation, January 26, 1990.

22. Shaich, Chuck, City of Torrance, Water District, and Christopher R. Harner, Ecology and Environment, Inc., telephone conversation, February 7, 1990.

23. Erikson, Bob, City of Manhattan Beach, Municipal Water Supply, and Christopher R. Harner, Ecology and Environment, Inc., telephone conversation, May 14, 1990.

24. Sharp, Sonja, Los Angeles County Department of Public Works, and Louise Flynn, Ecology and Environment, Inc., telephone conversation, March 22, 1990.

25. U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Weather Service, NOAA Atlas II, Precipitation-Frequency Atlas of the Western United States, Volume IX-California, p. 61, Silver Spring, Maryland, 1973.

26. California Department of Fish and Game, Marine Resources Division, "Catch Block Data for 1987," derived from annual 1AA, August 31, 1988.

27. California Department of Fish and Game, Natural Diversity Data Base, Venice Quadrangle, April 1, 1989.

28. Thomas Brothers Map, Los Angeles County 1990 Thomas Guide, 1989.

APPENDIX

Contact Log and Reports

Preliminary Assessment Contact Log

Facility Name: H. Kramer & Company
Facility ID: CAD0087260267

Name	Affiliation	Phone #	Date	Information
James Rancilio	L.A. County Dept. of Public Works	(818) 458-6188	04/23/90	The Dept. will send well logs of the West Coast Basin Barrier Project. Received: 05/17/90.
Ahmib Saebfar	California Dept. of Health Services	(818) 567-3000	05/14/90	Site is not on Bond Expenditure Plan.
Jim Nishida	L.A. County Health Services Dept.	(213) 744-5127	05/14/90	The Dept. is not currently involved with the site, but is monitoring EPA progress.
Bob Erikson	City of Manhattan Beach	(213) 545-6521	05/14/90	See Contact Report.
Elmer Giebelhouse	L.A. County Health Services Dept.	(213) 974-8234	05/15/90	Dept. requires a written request for files. Request sent: 05/15/90.
Jim Ross	California Regional Water Quality Control Board	(213) 266-7550	05/18/90	The Board is not currently involved with the site.
Nestor Laguerta	California Dept. of Health Services	(818) 567-3000	05/18/90	See Contact Report.
Wendell Francisco	California Dept. of Health Services	(818) 567-3077	05/21/90	The Dept. is not currently involved with the site since EPA is the lead agency.

CONTACT REPORT

AGENCY/AFFILIATION: California Department of Health Services		
DEPARTMENT: Toxic Substances Control Division		
ADDRESS/CITY: 1405 North San Fernando Boulevard, Suite 300, Burbank		
COUNTY/STATE/ZIP: Los Angeles County, California		
CONTACT(S)	TITLE	PHONE
1. Nestor Lagherta	Office Technician	(818) 567-3000
2.		
E & E PERSON MAKING CONTACT: Christopher R. Harner		DATE: 05/18/90
SUBJECT: File Search		
SITE NAME: H. Kramer & Company		EPA ID#: CAD008260267

Neither H. Kramer & Company, nor Harshaw Chemical Company are listed in the Resource Conservation and Recovery Act (RCRA) database or on the State of California Bond Expenditure Plan.

Harshaw Chemical Company is not listed in the Abandoned Site Project Information System (ASPIS), and the California Department of Health Services has no file under this name.

The file for H. Kramer & Company contains only the two versions of the site characterization workplan prepared by Thorne Environmental.

H. Kramer & Company/ Calif. Div., located at 1 Chapman Way in El Segundo, is listed in ASPIS, File Number 19-33-0144. The former address is 631 South Aviation Boulevard, El Segundo.

The facility status is inactive. A preliminary assessment was conducted by DOHS on 04/28/82. The site status was NFA on 06/09/83.

The current site status is UNR [unresolved].

CONTACT REPORT

AGENCY/AFFILIATION: City of Manhattan Beach		
DEPARTMENT: Municipal Water Supply		
ADDRESS/CITY: 1400 Highland Avenue, Manhattan Beach		
COUNTY/STATE/ZIP: Los Angeles County, California 90266		
CONTACT(S)	**TITLE**	**PHONE**
1. Bob Erikson		(213) 545-6521
2.		
E & E PERSON MAKING CONTACT: Christopher R. Harner		DATE: 05/14/90
SUBJECT: Well 3S/14W-29C03S		
SITE NAME: H. Kramer & Company		EPA ID#: CAD008260267

Well #15 (3S/14W-29C03S) has perforations at 210-300 and 375-420 feet below ground surface.

Well water is mixed with Municipal Water District Water (MWD) prior to distribution to the entire city of Manhattan Beach (approximately 43,000 people.) Alternate water sources are available from MWD. Well water usually only supplies about 15 percent of the total water supply.

CONTACT REPORT

AGENCY/AFFILIATION: Los Angeles County Department of Public Works	
DEPARTMENT: Planning	
ADDRESS/CITY: 900 South Fremont, Alhambra	
COUNTY/STATE/ZIP: Los Angeles County, California	

CONTACT(S)	**TITLE**	**PHONE**
1. Sonja Sharp		(818) 458-4324
2.		

E & E PERSON MAKING CONTACT: Louise Flynn	**DATE:** 03/22/90
SUBJECT: Flood Zones	
SITE NAME: Northrop WC H. Kramer & Company	**EPA ID#:** CAD000627273 CAD008260267

All of the City of El Segundo is in flood zone C. This means that the site is not located in a flood plain. There is no flood frequency associated this location. Ms. Sharp interpretted this information from a map of flood zones dated May 2, 1978.

CONTACT REPORT

AGENCY/AFFILIATION: City of Torrance		
DEPARTMENT: Water District		
ADDRESS/CITY: 3031 Torrance Boulevard, Torrance		
COUNTY/STATE/ZIP: Los Angeles County, California 90503		
CONTACT(S)	**TITLE**	**PHONE**
1. Chuck Schaich		(213) 618-2859
2.		
E & E PERSON MAKING CONTACT: Christopher R. Harner		DATE: 02/07/90
SUBJECT: Wells #4, 5 and 6		
SITE NAME: Allied Chemical Corp., El Segundo Works H. Kramer & Company		EPA ID#: CAD008326589 CAD008260267

City of Torrance wells #4, 5 and 6 are all in the same system. The system serves approximately 25,000 customers in Torrance north of Artesia Boulevard.

Water from the system is blended with Municipal Water District water prior to distribution.

WELL NUMBER	STATE ID NUMBER	PERFORATIONS
#4	4S/14W-10K02S	200-800
#5	4S/14W-10K03S	200-800
#6	3S/14W-34C02S	200-800

CONTACT REPORT

AGENCY/AFFILIATION: Southern California Water Company		
DEPARTMENT:		
ADDRESS/CITY: 3625 West 6th Street, Los Angeles		
COUNTY/STATE/ZIP: Los Angeles County, California 90020		
CONTACT(S)	**TITLE**	**PHONE**
1. Frank Costas		(213) 251-3631
2.		
E & E PERSON MAKING CONTACT: Louise Flynn		DATE: 01/26/90
SUBJECT: Well 3S/14W-14A01S		
SITE NAME: Northrop-AK H. Kramer & Company		EPA ID#: CAD000627398 CAD008260267

The well called El Segundo (3S/14W-14A01S) is in a gridded system. Water in this system is partially blended with Municipal Water District water. This well is perforated at 100 to 395 feet below ground surface, and serves a population of approximately 5,000 people.

CONTACT REPORT

AGENCY/AFFILIATION: California Water Service Company		
DEPARTMENT:		
ADDRESS/CITY: 1221 South Pacific Coast Highway, Redondo Beach		
COUNTY/STATE/ZIP: Los Angeles County, California 90277		
CONTACT(S)	**TITLE**	**PHONE**
1. Bert Mason	Production Superintendent	(213) 316-5686
2.		
E & E PERSON MAKING CONTACT: Louise Flynn		DATE: 01/05/90
SUBJECT: Wells #22, 30 and 802		
SITE NAME: Northrop-KB H. Kramer & Company		EPA ID#: CAD980665582 CAD008260267

California Water Service blends part of its system with Metropolitan and Colorado River Water. The immediate area around a well probably receives all groundwater. Of the total water used, probably 15 to 25 percent is groundwater. Mr. Mason estimates that approximately 25 percent of their 25,000 service connections receive groundwater.

WELL NUMBER	STATE ID NUMBER	PERFORATIONS
#22	3S/14W-29J01S	192-600
#30	3S/14W-29H01S	315-415
#802	3S/14W-32A02S	170-330

CONTACT REPORT

AGENCY/AFFILIATION: Southern California Water Company		
DEPARTMENT:		
ADDRESS/CITY: 3625 West 6th Street, Los Angeles		
COUNTY/STATE/ZIP: Los Angeles County, California, 90020		
CONTACT(S)	**TITLE**	**PHONE**
1. Frank Costas		
2.		
E & E PERSON MAKING CONTACT: Louise Flynn		DATE: 01/05/90
SUBJECT: Wells		
SITE NAME: Northrop-KB H. Kramer & Company		EPA ID#: CAD980665582 CAD008260267

The Southern California Water Company system is gridded, which means that it is blended with Municipal Water District Water in part, but some water goes directly from the wells to a storage facility and out to homes.

WELL	STATE ID NUMBER	PERFORATIONS	POPULATION SERVED
Chadron #1	3S/14W-22A01S	319-668	10,000
Chadron #2	3S/14W-22A02S	325-676	10,000
Chicago	3S/14W-21N01S	399-435	5,000
Compton	3S/14W-22L01S	352-458	7,000
Dalton #1	3S/14W-25P04S	544-744	6,000

F474

CONTACT REPORT

AGENCY/AFFILIATION: City of Havthorne		
DEPARTMENT: Water Department		
ADDRESS/CITY: 4455 West 126th Street, Havthorne		
COUNTY/STATE/ZIP: Los Angeles County, California 90250		
CONTACT(S)	TITLE	PHONE
1. Mark Arseneau		(2130 970-7902
2.		
E & E PERSON MAKING CONTACT: Jeffrey Muller		DATE: 12/19/89
SUBJECT: Wells #4, 8, 12, and 13		
SITE NAME: Allied Chemical Corp, El Segundo Works H. Kramer & Company		EPA ID#: CAD008326589 CAD008260267

Water from City of Havthorne wells #4, 8, 12 and 13 is treated, blended and combined with Municipal Water District (MWD) water. Overall, approximately 75 to 85 percent of the City of Havthorne's water comes from the MWD.

WELL NUMBER	STATE WELL NUMBER	PERFORATIONS
#4	3S/14W-09N04S	306-316 354-356 364-370 396-402
#8	3S/14W-09P01S	not available
#12	3S/14W-09N04S	300-350
#13	3S/14W-09M01S	282-438

The water system serves approximately 37,000 people in the City of Havthorne.

CONTACT REPORT

AGENCY/AFFILIATION: U.S. EPA		
DEPARTMENT: Site Evaluation Section		
ADDRESS/CITY:		
COUNTY/STATE/ZIP:		
CONTACT(S)	TITLE	PHONE
1. Paul La Courreye	Site Assessment Manager	744-1914
2.		
E & E PERSON MAKING CONTACT: Paul H. Brown		DATE: 8/14/90
SUBJECT: Progress on Site Investigation		
SITE NAME: H. Kramer and Co.		EPA ID#: CAD008260267

Paul indicated that the Emergency Response Section had an active lead at the H. Kramer site and that an "other EPA lead" would be entered into CERCLIS." The emergency response section has an agreement with the PRP for financing stabilization. Then DHS and RWQCB would continue remediation and monitoring. FIT should complete a summary memo and LSI prioritization memo.

8/20/90

Paul indicated that attaching the PA to the summary memo and including only new information concerning the site's plans for remediation, contact with DHS, RWQCB etc. would be adequate for the SSI.

pb/hk&c/clcr

REFERENCE # 20

H. Kramer

ecology and environment, inc.

717 W. TEMPLE ST., LOS ANGELES, CA 90012, TEL. 213-481-3870

International Specialists in the Environment

October 9, 1989

U.S. Environmental Protection Agency
215 Fremont Street
San Francisco, CA 94105

Ref. No. 19-0889-006
TDD No. T098810-045
PAN No. TCA1097-OMA

Attention: William E. Lewis, Deputy Project Officer

Subject: H. Kramer and Company, On-site Monitoring, Interim Report #1, El Segundo, California

In October, 1988, On-Scene Coordinator (OSC) D. Shane tasked the Technical Assistance Team (TAT) with monitoring duties at the H. Kramer and Company (HKC) site located in El Segundo, California. Activities to be conducted by TAT included workplan review, observation and documentation of workplan implementation and reporting to ensure that clean-up activities were in compliance with all elements of the workplan and CERCLA Section 106 Administrative Order. This interim report details Phase I monitoring activities conducted through August 30, 1989.

Background information and site history are detailed in TAT site assessment (SA) reports submitted previously under TDD# T098802-019. The following items were noted during the SA as posing potential risks to public health or welfare: slag pile, laboratory chemicals, leaking drums, furnace ash and cooling pond water/sludge. Sample collection and analysis data gathered during the SA investigation revealed extensive metals contamination throughout the abandoned secondary smelting facility.

This data prompted OSC Shane to issue HKC a CERCLA Section 106 Administrative Order (Number 88-17) detailing steps necessary to contain and prevent a release of hazardous substances from the facility. During the SA activities, HKC had entered into an agreement with Aero Industries regarding Aero accepting clean-up responsibilities in return for receipt of salvageable materials and a reduced purchase price on the property. It has been reported that Aero embraces a wide range of operations. Among other things, Aero operates a metals processing facility in Mexico. Aero expressed an interest in removing furnace structures, equipment and salvagables from the property. The Order directed HKC to submit a written proposal for the razing, demolition and salvaging of buildings, equipment and materials (Phase I). The Order also directed HKC to submit a written proposal for site characterization, removal, treatment and/or disposal of hazardous substances from the site (Phase II).

In June, 1988, Thorne Environmental submitted a workplan addressing Phase I requirements to the Environmental Protection Agency (EPA) on HKC and Aero's behalf. The exact agreement between Aero and HKC has not been revealed but it was learned that Aero has apparently provided an unspecified amount of monies to be used for Phase I and II activities. The workplan had been developed based on the requirements presented in Section V.B. of the Order addressing proposed Phase I activities. Specifically, the Order required the following elements:

1. Scope of work.

2. List of equipment and materials to be salvaged and their locations.

3. A site diagram or map designating and identifying areas where work will be conducted.

4. A schedule of daily activities.

5. A description of procedures that will be used to disassemble, dismantle, demolish or otherwise salvage items listed in (2) above.

6. A description of decontamination procedures for items in (2) above for the purpose of limiting exposure to hazardous substances.

7. A proposal for dust suppression during on-site activities.

8. A proposal for the clean-up of hazardous substances that pose a threat of airborne release to the environment.

9. A site safety plan.

In addition, the Phase I workplan was to address sampling, analysis and treatment/disposal of the waste oil, cooling pond water and laboratory chemicals that were identified in the SA investigation.

The workplan for the raising, demolition and salvaging of buildings, equipment and materials was reviewed by TAT and OSC Shane with several deficiencies being noted. In summary, the workplan did not fully address dust suppression activities, airborne release monitoring or wastewater treatment. On August 15, 1988, Thorne Environmental delivered a revised version of the workplan. This revision was reviewed and again rejected. A second revision was provided on September 23, 1988. It was determined that this plan sufficiently addressed the deficiencies and was approved by EPA for implementation on February 9, 1989. The approved workplan is available in the Los Angeles TAT and EPA files. Sometime after the workplan had been approved, HKC representatives changed contractors and ENSR Incorporated was selected to replace Thorne Environmental. ENSR, in turn, adopted the formally approved plan for implementation.

Phase I activities began on April 3, 1989 with a meeting to review workplan elements. The meeting was attended by representatives from ENSR, EPA, TAT, Los Angeles Department of Health Services (LADHS) and ENSR's subcontractors. Subcontractors included BLI International (BLI), GLX Inc., (GLX), California Chemical Disposal (CCD) and Stanco Vacuum Service (SVS).

Phase I had originally been directed towards the razing, demolition and salvaging of buildings, equipment and materials. Aero had since expressed an interest in leaving the on-site furnace system intact. Aero has anticipated that the large industrial furnaces previously used in HKC's smelting process can be modified to accomodate reprocessing of the slag. Therefore, the Phase I activities were to address only municipal trash and salvageable metals cleanup, vacuuming of surface dust, waste oil/cooling pond water disposal, laboratory chemical disposal and a high pressure wash of the furnace building structure. All of these activities had been included as part of the original Phase I workplan, therefore EPA allowed ENSR to carry out the duties without submitting another plan for approval. Equipment mobilization continued throughout the week of April 3 and concluded with a pre-work site safety meeting on April 7, 1989.

The meeting was held to insure that all project personnel were aware of the anticipated hazards on-site. S. Meyers, ENSR's industrial hygienist, was in charge of site safety operations and covered level of protection requirements, exclusion zone/support zone locations, contaminants present and their associated exposure effects, heat stress symptoms and proper decontamination procedures. The meeting was adjourned with work activities being scheduled to commence at 0700 hours on April 10, 1989.

Site activities during the week of April 10 involved scrap metal and non-hazardous municipal trash cleanup. Contractors stockpiled scrap metal to one location on the facility grounds for future salvage. Three roll-off bins of wood and municipal trash were collected and removed for disposal. The waste oil comprised of 17 five-gallon or less sized containers and 42 55-gallon drums were staged to one area pending profile analysis and off-site disposal acceptance.

On April 18, 1989, surficial dust removal activities were initiated. Two SVC dry vacuum truck units worked around the clock to remove dust and debris from in and around structures. The collected material was staged in covered roll-off bins on-site. The vacuum trucks were on-site until April 22 but were unable to complete the scope of work. Due to prior commitments, the vacuum trucks departed and were scheduled to return a week later. Vacuuming activities were resumed and completed on May 1, 1989. A total of 29 roll-off bins of the potentially hazardous surficial dust was generated during the vacuuming effort. Composite samples for verification of hazardous materials were collected from several of the roll-off bins on May 5, 1989. Sample analysis data generated during the SA investigation generally indicated percentage levels of copper, lead and zinc. Off-site disposal of the contained materials has been put on hold until on-site recycling options have been further researched and formally proposed by HKC representatives. It has been suggested that the smelting system currently in place can be modified to accommodate reprocessing of the slag and surface debris.

Dust generation during work activities was controlled with the aid of water suppression. Air sampling for metal analytes was also conducted by ENSR personnel throughout the duration of Phase I. A personnel and perimeter sampling regime was established and carried out on a daily basis. It was reported that perimeter air samples were all recorded as non-detectable concentrations of the metal analytes. Elevated levels of lead were discovered during some of the personnel sampling episodes but were within protection boundaries of the respirator filtration media being utilized.

The furnace building structure was pressure washed on April 28, 1989. A high pressure water canon was used to spray the interior and exterior of the building. Water run-off was controlled by perimeter sandbag dikes. The water was added to the existing water in the cooling pond for disposal at a later date.

On-site Phase I activities were concluded by ENSR in May, 1989. However, some details need to be addressed before Phase I can be considered complete. Specifically, the waste oil and cooling pond water have not been sent off-site. Sampling and analysis has been completed and ENSR has reported that the oil and water have been accepted for treatment at Gibson Oil and Refining, Inc's (GORC) Bakersfield facility. GORC is a state permitted facility that is authorized to accept waste oil and California waste categories 213, 221, 222, 223 and 241. To date, final handling of these materials has not been scheduled. Additionally, the laboratory chemicals were not considered during Phase I. ENSR has stated that the chemicals will be included as a Phase II job task.

The Phase II workplan detailing site characterization investigations was submitted to EPA by ENSR on June 5, 1989. TAT and OSC Shane reviewed the workplan and provided revision requirements to ENSR. ENSR has since made the necessary changes and EPA approval is expected by Fall of 1989. In addition to the remaining Phase I items discussed above, Phase II investigation objectives are to include assessment of constituents within the subsurface soils/groundwater, generation of analytical data to characterize the slag pile, assessment of potential metal migration into subsurface soils/groundwater and establish groundwater flow direction and hydraulic gradient. TAT will maintain an on-site presence to insure adherence to workplan elements once scheduling has been formalized.

If you have any further questions regarding these on-site monitoring activities, please do not hesitate to contact this office. Photodocumentation is contained in the Attachment.

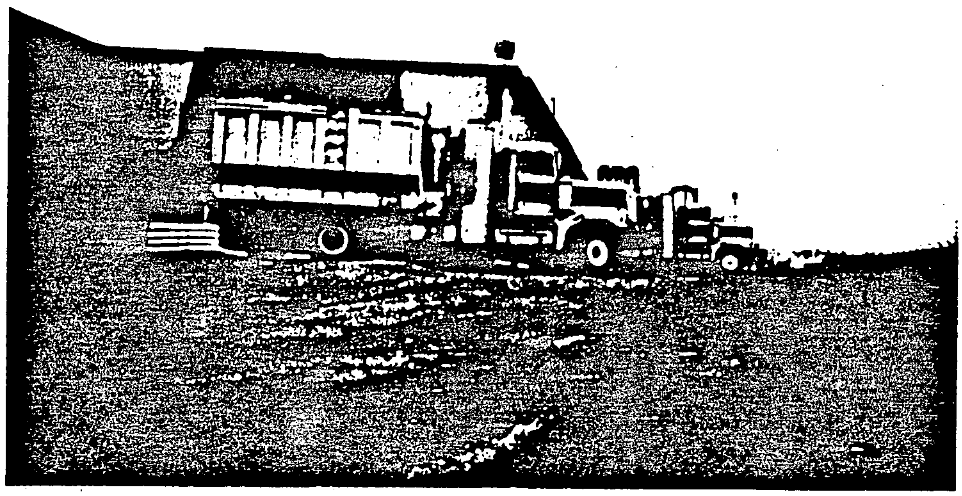
Sincerely,

Randy Randall
Technical Assistance Team Member

RR:st

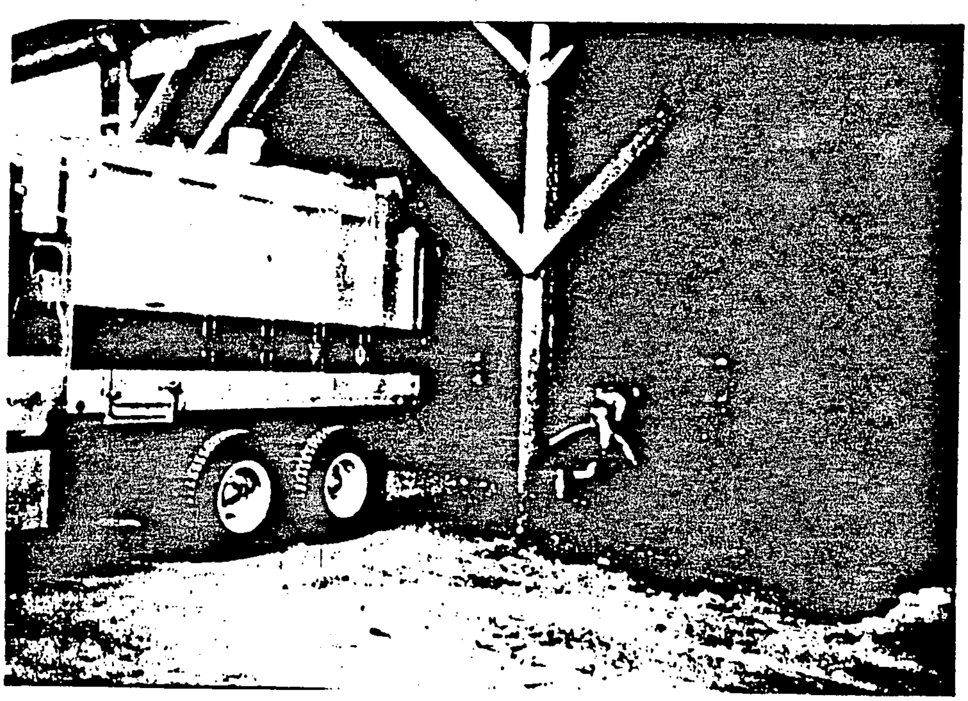
cc: D. Shane
File

ATTACHMENT



Stanco vacuum trucks on-site.

Photographer: R. Randall Date: 04/16/89



Stanco vacuum trucks in operation.

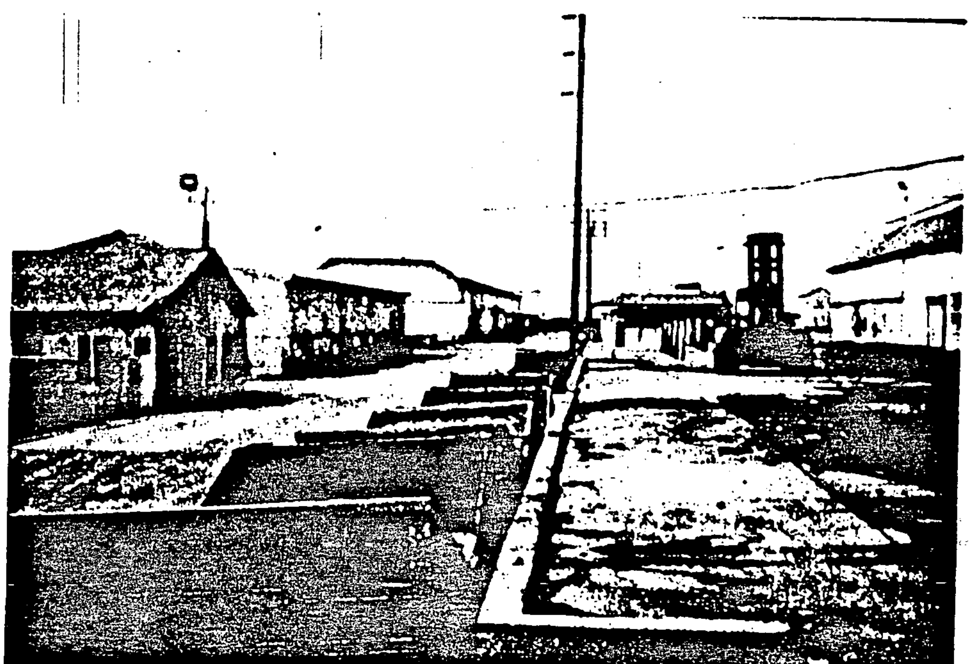
Photographer: R. Randall Date: 04/16/89

H. Kramer and Company
El Segundo, California

TDD#: T098810-045 PAN#: TCA1097-OMA

Vacuum truck crew removing surficial debris.

Photographer: R. Randall Date: 04/16/89



Staged roll-off bins for surficial debris storage

Photographer: R. Randall Date: 04/20/89

Staged drums of oil waste pending disposal.
Photographer: R. Randall Date: 05/11/89

Pressure wash of furnace building interior.
Photographer: R. Randall Date: 05/11/89

REFERENCE # 21

NDDB ENDANGERED SPECIES SEARCH H KRAMER SITE, EL SEGUNDO

EUPHILOTES BATTOIDES ALLYNI	*NDDB Inventory* *Priority*	*Legal* *Status*
EL SEGUNDO BLUE	G?	Fed: ENDANGERED
Element Code: SAJEK04	S1	Calif:

Occ No: 1 Date Site Last Obs:1984/08/ (Y M D) Date Elem Last Seen:1984/08/ (Y M D)

Location/Directions:
EL SEGUNDO DUNES, JUST W OF LAX.

Description/Comments:
HABITAT QUALITY POOR DUE TO WEEDS AND EXOTIC PLANTS STABILIZING SAND. 70 PERCENT OF ESTIMATED 756 ERIGONUM PARVIFOLIUM PLANTS (LARVAL FOOD PLANT) ARE SENESCING. TWO OF 16 ERIGONUM PATCHES SUPPORT 75 PERCENT OF ESB POPULATION. POPULATION NUMBERS ARE LOW ENOUGH TO POSSIBLY CAUSE GENETIC PROBLEMS.

Major Info Source: ARNOLD, R.A. 1978 (LIT)

Ownership/Management: LAX

Condition: DAMAGED OR DECLINING
Security: N Occ Rank:
Quad--NDDB: 3311884 DWR: 090B
Quad Name: VENICE
County: LAX Map Symbol #: 2
Precision: SPECIFIC Boundary: DOTTED
T 3S R15W S99 Fraction: -- of -- Merid: S
Elev: 140 Lat: 33d 55m 58s Long: 118d 25m 59s

General Habitat:
Area: 90
Owner Protecting: N

Sources: ARN78R01 ARN84R01 ARN84R02

89/ 7/12

****

Occ No: 2 Date Site Last Obs:1984/08/ (Y M D) Date Elem Last Seen:1984/08/ (Y M D)

Location/Directions:
EL SEGUNDO DUNES-CHEVRON REFINERY COLONY.

Condition: DAMAGED OR DECLINING
Security: N Occ Rank:
Quad--NDDB: 3311884 DWR: 090B
Quad Name: VENICE
County: LAX Map Symbol #: 3
Precision: SPECIFIC Boundary: NONE
T 3S R15W Fraction: -- of -- Merid: S

Descripti omments:

ESB POPULATION AT THIS SITE HAS DECLINED DRAMATICALLY OVER THE EIGHT YRS THAT ARNOLD HAS ANALYZED IT DUE TO DETERIORATION OF HABITAT QUALITY. SEASONAL POPULATION ESTIMATE FOR BECAUSE POPULATIONS NATURALLY EXIST AT VERY LOW LEVELS.

Elev: Lat: 33d 54m 58s Long: 118d 25m 14s

General Habitat:

Area: N/A

Owner Protecting: N

Major Info Source: ARNOLD, R.A. 1978 (LIT)

Sources: NAG80R01

Ownership/Management: DPR-MANHATTAN SB

89/ 7/12

****

Date of Report: 04/30/91 --- Data Expiration Date: 03/ 5/90

REFERENCE # 22

MEMO TO FILE/CONTACT REPORT

PERSON CONTACTED: George Farag

DATE: 4-30-91

REPRESENTING: Los Angeles County Flood Control District

TIME: 4:00

ADDRESS: 900 South Freemont Street
Alhambra

PERSON TAKING OR MAKING CALL: David Stuck

PHONE NO: (818) 458-6123

SUBJECT: Benificial Uses of the Dominguez Channel

MESSAGE: The Dominguez Channel leads directly to the ocean. There are not any spreading grounds or recharge basins along its length. Water intakes for either drinking water or injection purposes do not exist.